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# Exploring the impact of unhealthy food and drink marketing on children's implicit and explicit brand attitudes and preferences

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# Exploring the impact of unhealthy food and drink marketing on children's implicit and explicit brand attitudes and preferences

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# DEDICATION

This thesis is dedicated to my parents, Richard and Sharon Smith, who inspired my love of learning and are the most supportive parents I could ever ask for.

# ACKNOWLEDGEMENTS

Never in a million years did I foresee that weeks after my 21st birthday, I would move from the UK over to Wollongong, Australia (a place that many of my friends thought I'd made up) to fully immerse myself in my favourite thing to do, public health research! I am so grateful to have completed this wonderful chapter of my life. This accomplishment was by no means a solo feat, and there is a fantastic group of people, who all deserve a huge thank you.

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# CERTIFICATION

I, Rachel Elizabeth Smith declare that this thesis submitted in fulfilment of the requirements for the conferral of the degree Doctor of Philosophy, from the University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. This document has not been submitted for qualifications at any other academic institution.

Rachel Elizabeth Smith

March 2019

# ABSTRACT


**Background**

Children live in a media-saturated environment, as the unsolicited recipients of powerful food marketing coercion. Their aptitude in digital communications, paired with their natural credulity, lack of cognitive defences and inexperience, makes children the most desirable demographic available to marketers. Marketing techniques used to promote unhealthy foods are sophisticated, persistent and influence food attitudes, preference and consumption – outcomes that are all included in a Hierarchy of Effects sequence of effects that link food promotions to individual-level weight outcomes. Childhood obesity undermines the physical, social and psychological well-being of children and is a known risk factor for adult obesity and many non-communicable diseases. As such, the highest levels of international policy setting have prioritised the restricting of food marketing to children as a population-based intervention to alleviate non-communicable diseases by 2025.

A perceived lack of evidence that food marketing can directly contribute to childhood obesity currently impedes policy change. A critical appraisal of the evidence identified gaps in knowledge that require further assessment; specifically, more evidence was required to address the impacts of food marketing on children's explicit and implicit cognitive processes. The methodologies used to measure this were limited, thus there was a need to conduct research with children in exploratory and innovative ways. Secondly,

the body of evidence required more research of the modern marketing techniques, such as those used in digital marketing, so research synchronises with the contemporaneous techniques used to interact with children.

**Aim**

The research presented in this thesis explored the impact of unhealthy food and drink marketing on children's implicit and explicit brand attitudes and preferences. Specifically, the research aimed to implement new research methodologies and explore the impact of exposure to modern advertising techniques (with a focus on those used in online gaming contexts).

**Methods**

Three research studies explored the explicit (Study One) and implicit (Studies Two and Three) impacts of unhealthy food marketing in children aged 7-12 years. Study One (n = 52) examined an explicit response using a qualitative child-centered methodology, and innovatively used participant-developed stimuli. Interviews explored the marketing landscape and the appeal of persuasive food marketing techniques from a child's perspective. Study Two (n = 48) sought to identify the presence of an implicit relationship between children and their favourite food brands (photograph stimuli provided by the participants). A physiological methodology measured arousal - electrodermal activity (EDA). Study Three (n = 156), a randomised controlled trial, used an online game to explore the impact of different advertising techniques that are

commonly paired with games children play. The advertising techniques included banner advertising, advergames, and rewarded video advertising, used to promote an unfamiliar confectionary brand.

**Findings**

Study One demonstrated persuasive techniques used to market unhealthy foods to children successfully engaged with and influenced them. The children identified the techniques most appealing to children their age and had clearly internalised and understood these marketing techniques, as they could apply them creatively to hypothetically market similar products. The key themes that emerged included: use of characters, place of exposure, fun, self-identity and branded jargon.

Study Two revealed children were significantly more aroused by branded images of their favourite food and beverage products than by the unbranded counterparts (i.e. the same products without the packaging) ($F(1, 47) = 4.37$, $p = .042$). The arousal response to the branded products did not statistically differ to the arousal response to photographs of children's family and friends. This finding indicated the children had made strong relationships with their favourite brands, similar to the other strong relationships in their lives.

Finally, Study Three highlighted the persuasive techniques used to promote an unfamiliar food brand in an online gaming context were influential on children's attitudes and preferences. Children who were exposed to the rewarded video

advertising chose the test brand significantly more than children in the other three conditions ($p < 0.002$). Condition did not influence overall energy intake measured in grams ($p = 0.78$) or kcals ($p = 0.46$). The children were significantly aware of advertising in the rewarded advertising condition, whereas they were not significantly aware of advertising in the other conditions, which did not influence children's attitudes and behaviour.

**Significance and contribution to knowledge**

Study One made a valuable contribution to the body of evidence by bringing children's perspectives into conversations about policies that impact them the most. As children are a central focus of the obesity crisis, it is critical to understand the effects of accumulative and long-term exposure to marketing outside of experimental research and to explore children's real-life experiences with food brands.

This was the first study to the researcher's knowledge to use participant-developed stimuli to explore the impacts of food marketing, which is vital to explore the broader interaction with children and the unhealthy food marketing landscape. The findings contribute new evidence and insights into the psychological power of everyday marketing exposures and identify the marketing techniques children find most appealing. This explicit detail is essential as the findings can serve as a guide to identifying pertinent techniques as foci of regulation to restrict food marketing.

Study Two is the first study to the researcher's knowledge to measure children's preference for a branded food product versus the product in its 'unbranded state' (unpackaged), using physiological methodology – a methodology less prone to bias. This study revealed children have an implicit response to their favourite brands. This implicit arousal response was stronger than an arousal response to the same product unpackaged but similar to an arousal response to images of their friends and family. Research would suggest unpackaged food is perceived as more accessible, directly appetitive and has previously shown better physiological appetitive responses than packaged products. This implies that children have developed deep, implicit connections with their favourite food and drink brands, which exist independently of the actual food product, and that have developed through the power of marketing.

Study Three addressed the need to explore the impacts of contemporary advertising techniques used in online gaming contexts. Research previous focused solely on the impact of advergames but not the impacts of other types of advertisements in gaming contexts. A randomised controlled trial was conducted and the marketing techniques most influential children's attitudes and preferences were identified. This study highlighted children's brand attitudes and choices were influenced by the delivery of brand messages using highly sophisticated advertising techniques, in addition to simple exposure to a brand. In an era of increasing digital and mobile game use, this study indicated an awareness of advertising is insufficient to protect children, as they remain vulnerable to the effects of advertisements. Rewarded video advertising has not been investigated before in academic research on children's food behaviours.

These findings suggest it should be a high priority for effective marketing regulation interventions.

Overall, the findings reported from the three studies emphasise the power of food marketing and highlight the need for stricter regulation on the extent and power of food marketing to children. This research adds a significant contribution to the evidence supporting the need for legislation to limit unhealthy food marketing to help protect children.

# STATEMENT OF THESIS STYLE

In agreement with my supervisors, this thesis has been prepared in a journal article compilation style format. This format was considered most appropriate for this thesis because it comprised three studies, which are most suitably disseminated in their original manuscript format.

# PUBLICATIONS CONSTITUTING THIS THESIS

## Published manuscripts

**Chapter Two**

Smith R., Kelly B., Yeatman, H., & Boyland, E. (2019). Food marketing influences children's attitudes, preferences and consumption: a systematic critical review. *Nutrients*, *11*, 875.

**Chapter Five**

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## Manuscripts under review

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## Conferences

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# LIST OF ABBREVIATIONS

| Abbreviation | Full Name |
|---|---|
| AANA | Australian Association of National Advertisers |
| ABS | Australian Bureau of Statistics |
| ACMA | Australian Communications and Media Authority |
| ANOVA | Analysis of Variance |
| Apps | Applications |
| BMI | Body mass index |
| CASP | Critical Appraisal Skills Program |
| EDA | Electrodermal activity |
| ELM | Elaboration Likelihood Model |
| fMRI | Functional Magnetic Resonance Imaging |
| g | Gram |
| Kcal | Kilocalorie |
| kJ | Kilojoules |
| NCDs | Non-communicable diseases |
| NHLBI | National Heart, Lung and Blood Institute |
| NIH | National Institute of Health |
| NSW | New South Wales |
| P & C programs | Preschool and Children's Programs |
| PRISMA | Preferred Reporting Items for Systematic Reviews and Meta-analyses |
| PROSPERO | International Prospective Register of Systematic Review |
| p-value | Probability value |

| | |
|---|---|
| QSRI | Quick Service Restaurant Initiative for Responsible Advertising and Marketing to Children |
| RCMI | Responsible Children's Marketing Initiative |
| RCT | Randomised controlled trial |
| SCL | Skin conductance level |
| SCR | Skin conductance response |
| SCR-amp | Skin conductance response amplitude |
| SD | Standard deviation |
| SEIFA | Socio-Economic Indexes for Areas |
| SES | Socio-economic status |
| TV | Television |
| UK | United Kingdom |
| UNICEF | United Nations Children's Fund |
| USA | United States of America |
| Vlog | Video blog |
| Vlogger | Video blogger |
| Vs | Versus |
| WHO | World Health Organization |

# 1.0 CHAPTER ONE - INTRODUCTION

## 1.1 Background and rationale of thesis

### 1.1.1 Childhood obesity

Globally there are over 340 million children aged 5-19 with overweight or obesity (World Health Organization, 2018b). This figure poses not only a serious public health challenge but also breaches children's rights to health and development, as stated in Articles 6 and 24 of the United Nations Conventions on the Rights of the Child (United Nations General Assembly, 1989). In Australia, there are one in four children (26%) aged 5-12 years with overweight or obesity (Australian Bureau of Statistics, 2015), signifying a large cohort of children vulnerable to detrimental health effects associated with excess weight. Immediate and long-term health outcomes include dental caries (Moynihan, 2002), type-2 diabetes (Lee, 2006), cardiovascular problems (Freedman et al., 2007) and an increased risk of at least 13 types of cancers (World Cancer Research Fund, 2018). Obesity presents substantial health and economic cost for governments (Australian Institute of Health and Welfare, 2017) and individuals (Lee et al., 2018). As childhood overweight tracks into adulthood (Whitaker et al., 1997), there are significantly high stakes and incentives for public health intervention at a young age (Brown et al., 2018).

Fundamentally, obesity develops from a prolonged imbalance between energy consumed and energy expended (Australian Institute of Health and Welfare, 2015), which manifests from a complex, multifaceted web of biological and

environmental determinants (Monasta et al., 2010). Up to 90% of the population is genetically predisposed to overweight and obesity and when paired with an obesity-promoting environment, it is almost inevitable that obesity would occur at high rates (Leung, 2014). The 'obesogenic environment' (Swinburn and Egger, 2002), in particular the restriction of unhealthy food and beverage marketing to children (herein referred to collectively as 'unhealthy food' or 'food marketing'), has been established by the World Health Organization (WHO) as a global health priority (World Health Organization, 2010, World Health Organization, 2018a). It is one of 25 targets set by the World Health Organization to reduce non-communicable disease premature mortality by 2025 (World Health Organization, 2011).

### 1.1.2 Pervasiveness of unhealthy food marketing

Unhealthy food is extremely palatable, yet the taste differences within a food category can be very subtle. Branding, which refers to giving a product a curated identity to differentiate from competitors (Bennett and Cooper, 1984), is a critical component of a company's marketing strategy. Strong branding has been shown to elicit brand preference in a number of experiments investigating influences on food choice, highlighting that branded products are universally more appealing and are rated as more appetising than identical products with fewer or no brand identifiers (Boyland et al., 2013, McGale et al., 2016). Multinational food companies invest considerable resources into building their brand and contribute to the extreme disparity between advertising for different food groups (Schwartz et al., 2013), whereby marketing budgets dwarf government spending on promoting good nutrition (O'Dowd, 2017). This

generates a backdrop of ubiquitous promotion, otherwise referred to as a 'brandscape' (Sherry Jr, 1998).

Unhealthy food marketing commonly exists at locations where children frequent (Signal et al., 2017, Smith et al., 2019), such as outside schools (Kelly et al., 2008b, Signal et al., 2017) and in supermarkets (Harris, Schwartz, & Brownell, 2010). In these areas, the marketing density and potential for repeated exposure are issues of concern (Campbell et al., 2014, Kelly et al., 2008b). Children also live in media-saturated environments (Story and French, 2004), in which screen time has become the predominant recreational activity of children (Sigman, 2015). A setting of screens and digital platforms can provide brands with the opportune context for pervasive omnichannel marketing campaigns that facilitate new customer acquisition and heightened brand exposure (Brynjolfsson et al., 2013). Companies may use this multi-pronged approach because online marketing can further amplify the effects of unhealthy food marketing on television (Peterson, 2014, Tatlow-Golden, 2016). High saturation of marketing messages occurs as users move between and across platforms simultaneously and concurrently (Kelly et al., 2015b). For example, two in three smartphone users use their phones to learn more about products viewed in television advertisements (Gevelber, 2015) and over one-third of children visit a website after seeing the address advertised on television or on a product package (Brady et al., 2008).

Evidence suggests companies that manufacture unhealthy food have embraced screen-based vehicles of promotion by flooding media with their advertising

campaigns. For instance, a global study has revealed nearly a third (29%) of television advertisements during the most popular children's viewing times, advertise food, with unhealthy food contributing up to 87% of advertisements (Kelly et al., 2010). A more recent study conducted on free-to-air television in Australia similarly revealed the frequency of unhealthy foods was 2.3 times higher than healthy foods (Smithers et al., 2018). In addition, internet exposure studies have highlighted the popularity of display advertisements (e.g. banner advertisements - electronic advertisements that appear on the top or bottom of a webpage (BusinessDictionary.com, 2018a)) for food and beverages across popular children's websites. The US Rudd Centre for Food Policy and Obesity monitored the prevalence of display advertisements for food and beverages across children's websites and calculated that during an 11 month period there were more than three billion impressions for food and beverage advertisements (Ustjanauskas et al., 2014). Another study found 14.4 million food advertisements shown across 10 of the most popular youth websites were mostly for unhealthy food products (83.5%) (Potvin Kent and Pauzé, 2018). With exposure statistics this striking, there is unmistakable evidence children are deliberately targeted by the food industry.

### 1.1.3 Children as vulnerable consumers

The term "child" applies to all children and adolescents under the age of 18 years according to the United Nations Convention on the Rights of the Child (United Nations General Assembly, 1989). A multitude of factors makes children the most desirable demographic available to marketers (Garde, 2018).

Children wield strong buying power through access to disposable income (Institute of Medicine, 2006), and have extensive influence on their families' buying choices (Story and French, 2004). Unhealthy food is more likely to be sold at a discounted price or on promotion than healthier items (Boyland et al., 2012), therefore it offers a more accessible purchase for children who are spending independently or are persuading their families.

Companies are acutely aware that the development of brand loyalty, essential for maintaining consistent sales, is most lucrative when it begins at a young age, after which companies can anticipate a lifetime of purchases (Bourquin et al., 2016). Consequently, brands aim to develop long-lasting relationships with children through fulfilling their symbolic and hedonic needs (MacInnis, 2012). This is executed by the use of content created to resonate with individuals (O'Neal, 2016, van Reijmersdal et al., 2017) and the staging of brands as tools for children to express themselves (Cătălin and Andreea, 2014). It is believed that from the age of two years old, children can identify and evaluate brands and products of preference when asking for presents (Macklin, 1994). Sequentially, as they grow children begin to use brands to express themselves as they develop self-concepts and participate in self-appraisals of how they view themselves (Baumeister, 1999, Chaplin, 2005). It is within the period between 7-13 years of age that emotional connections with brands increase in number and depth (Chaplin, 2005) and underlie long-term brand relationships (Keller, 2003).

Perhaps the most significant factor is the vulnerability of children's cognitive limitations when exposed to marketing. It is widely accepted that from a young

age – approximately around eight years old (Rozendaal, 2010), children begin to have a basic level of understanding regarding the intentions underlying advertising (Moses and Baldwin, 2005). However, it is believed by 12 years old they still will have not yet acquired a comprehensive level of understanding (Rozendaal, 2010) and may not be able to deploy executive brain functioning effectively until later in their development (Moses and Baldwin, 2005). The prefrontal cortex, where executive function skills develop, including decision making and implementing strategies, is the last of all the brain regions to mature (Diamond, 2002). It continues to develop through adolescence into early adulthood (Diamond, 2002). Therefore, the immaturity of children's executive function skills may have a substantial impact on their ability to defend against advertising (Moses and Baldwin, 2005).

### 1.1.4 The evidence: the influence of unhealthy food marketing on children

The WHO acknowledges the importance of determining not only the impact of quantified *exposure* to food marketing but also the persuasive *power* of marketing's design, creative content and execution (World Health Organization, 2012). Rich brand experiences are believed to begin long before consumption, and end long after as an experience embedded in memory (Tynan and McKechnie, 2009). As such, marketing can affect children in the absence of actual consumption, by influencing the development of attitudes and associations. Persuasive marketing activates two paths of influence - explicit and implicit routes of cognition – which can be manipulated to influence a consumer's attitude, associations and preferences and, in turn, inform their behaviours. For example, premium offers are a frequently used explicit

marketing stratagem (Jenkin et al., 2014) directed at conscious decision making at the point of sale, intended to influence a decision towards a particular brand or product (Glanz et al., 2012). Concurrently, and increasingly used in the marketing of food to children (Folta et al., 2006), implicit marketing messages aim to influence attitudes by circumventing cognitive awareness and processing. These messages involve the pairing of stimuli (e.g. a product with a feeling) to create a positive association and are believed to be critically influential in the early development of attitudes (Rudman, 2004). As a result, it is recognised that the earlier children are exposed to food marketing messages, the more susceptible they will be to the long-lasting effects (Harris, 2009). The use of two-fold processing routes has the potential to cause serious impact, as even those children who may have their cognitive defences activated for explicit cues (that are arguably more easily recognised) may still be vulnerable to implicit cues.

Assisted by the advantage of two operating pathways, the influence of the marketing of unhealthy food to children may have a far greater reach than to only those who frequently consume the advertised products, with the potential to influence those who have varying levels of encounters with it. This has been demonstrated by empirical studies that evaluated the impact of exposure on children's food attitudes and preferences in the absence of consumption. For example, exposure to television advertisements in the absence of the opportunity for consumption leads to increased preferences for the advertised products when presented with them, which is not moderated by age (Chernin, 2008). Moreover, exclusively visual exposure (on a screen) to cartoon

characters on unhealthy product packaging leads to an increased positive attitude towards the brand and a higher association of fun (Arrúa et al., 2017). This pattern also was found in studies that allowed children to consume the advertised food product. These studies found television advertisements for unhealthy food lead to positive attitudes toward, increased preferences for and increased consumption of, unhealthy foods (Chernin, 2008, Esmaeilpour et al., 2018, Gilbert-Diamond et al., 2017, Halford et al., 2008b). The magnitude of effects were greatest in children exposed to the most of this kind of marketing (Boyland, 2016). Branded packaging combined with promotional characters also influences all three proximal outcomes (Ares et al., 2016, Kotler et al., 2012, McGale et al., 2016, Ülger, 2009).

More recently, studies have attempted to emulate the strategies used in contemporary marketing, known as 'new media' or digital technologies, including the internet and mobile devices (Kelly et al., 2015b). The WHO recognised children readily access digital media for longer periods than traditional media, on a range of devices, with little protection or regulation from emotive, immersive and behavioural advertising (World Health Organization, 2016). When paired with exposure to unhealthy food marketing this media use behaviour of children can have detrimental effects on their attitudes, preferences and consumption (World Health Organization, 2016). Research has most commonly evaluated the influence of new media through exploring the influence of advergames, revealing significant influences on children's attitudes, preferences and consumption (Folkvord et al., 2017, Harris et al., 2012, Norman et al., 2018). Advergames are a marketing tool that facilitate a

brand rich environment (Giallourakis, 2009), whilst simultaneously disguising the true advertising intent behind the game (Vanwesenbeeck et al., 2017). It is likely advergames influence the player through implicit mental processes. For example, the product or brand is often associated with 'fun' and this positive association is transferred into the implicit memory non-intentionally, and later retrieved non-consciously when the product or brand is seen at another occasion (Coates, 2006). As children may be unaware of the marketing process, this suggests that covert advertising, extensive in advergames, may be more influential on attitudes than advertising using traditional media. This influence is further exacerbated because interactions with advergames are much longer and more immersive than television advertisements (Moore, 2004). Thus, they have the potential to impose an intensified influence on children compared to traditional media.

Harris et al. (2009) have noted the failure to recognise the influence of implicit processing is a common misperception of the effects of food marketing (Harris, 2009). Specific misperceptions are as follows: that marketing tactics processed by consumer in a less active manner will be less effective and marketing tactics consumers do not consciously perceive will have no effects (Harris, 2009). Many studies have refuted this perception through the use of psychological phenomenon of 'priming' to measure how exposure to a stimulus can influence an individual's subsequent behaviour (Campbell et al., 2016, Harris, 2008, Harris et al., 2009b). Priming is a psychological phenomenon which refers to the facilitative effects of an encounter with a stimulus, subconsciously attended to, on future processing of the same or related stimulus (Tulving, 1982).

Additionally, subliminal stimuli produce stronger 'mere exposure' effects (the phenomenon of a preference developing simply because something is more familiar), than clearly identified stimuli (Bornstein, 1989).

A number of studies also have identified that understanding the persuasive intent does not provide a defence against advertising, as an understanding or scepticism of marketing intent does not reduce any influence effects on preference (Chernin, 2008, Ross et al., 1984). Contemporary marketing strategies appear to be evolving more rapidly than children's concepts of how marketing typically manifests, as children do not easily recognise non-traditional marketing as forms of promotion (Ali et al., 2009, Owen et al., 2013, Williams, 2011). This is problematic, as failure to recognise marketing means the necessary cognitive defenses required to protect themselves from effects on their behavior are not activated (Harris, 2009). This view is also taken by the Processing of Commercialized Media Content (PCMC) model (Buijzen, 2010), which suggests children automatically process food cues embedded in new forms of advertising, and this minimal cognitive elaboration makes it extremely difficult to initiate consumer defenses (Buijzen, 2010). The model therefore predicts that when children use less cognitive elaboration, the extent to which food advertising impacts on their eating behavior will be much stronger (Buijzen, 2010).

### 1.1.5 Current food marketing regulations

Despite unequivocal evidence of the detrimental health effects food marketing poses (World Health Organization, 2016), Australia has not yet enacted

substantive statutory regulation to protect children from food marketing. As a Member State of the WHO, in 2016, Australia endorsed WHO recommendations to end childhood obesity, including the development of regulations on the marketing of complementary (unhealthy) foods and beverages (World Health Organization, 2016). However, years later government-led legislation for the responsible marketing of unhealthy foods to children is relatively unimplemented in Australia, with the exception of a limited set of restrictions on television food advertising during 'P' and 'C' (preschool and children's) programs (Australian Communications and Media Authority, 2009a). Enforcement of the Children's Television Standards (Australian Communications and Media Authority, 2009a) has not adequately reduced children's exposures to unhealthy food marketing during broadcast times when they watch television (Watson et al., 2017). Despite this, when these restrictions were subject to review in 2009, a lack of evidence was found for strengthening and extending the standards (Australian Communications and Media Authority, 2009b).

The core responsibility for regulating food marketing is currently placed on food manufacturers, the industry's preferred approach (Moodie et al., 2013). In Australia, there are two self-regulatory codes for 'responsible' food marketing to children (Australian Food and Grocery Council, 2014a, Australian Food and Grocery Council, 2014b). These are the Responsible Children's Marketing Initiative (RCMI) and the Australian Quick Service Restaurant Industry (QSRI) Initiative for Responsible Advertising and Marketing to Children, led by the Australian Food and Grocery Council (AFGC). These codes operate on a

voluntary basis that requires signatories to agree to a framework of responsible marketing to children. For example, the AFGC pledge to not directly market unhealthy food and drink products to children under 12 years old (Australian Food and Grocery Council, 2014a). These codes are voluntary, with a number of shortcomings that render them ineffective in protecting children from food marketing (Mills, 2015). Firstly, not all companies agree to comply (Coalition on Food Advertising to Children, 2007). Secondly, the codes comprise ill-defined standards frequently interpreted loosely by signatories, and when the codes do apply to marketing content, there are no sanctions or penalties beyond requesting withdrawal of the campaign, likely to be directed when the campaign had already finished (Coalition on Food Advertising to Children, 2007).

Lack of evidence food marketing directly contributes to childhood obesity has been cited as a fundamental reason for the government policy inertia in Australia (Australian Communications and Media Authority, 2009b). The perception that there is a lack of evidence guides the rhetoric of the food industry (Coalition on Food Advertising to Children, 2007) as a means to deflect stronger forms of regulation and to simplify business operations without regulative hurdles (Hawkes, 2008). The review that informed this decision not to extend the Children's Television Standards is now a decade old (Australian Communications and Media Authority, 2009b), thus reconsideration of the growing body of evidence is overdue.

The WHO advises children require protection from targeted food marketing, under the United Nations Convention on the Rights of The Child (United

Nations General Assembly, 1989), by ensuring the protection of children's health and privacy, including when they are participating in digital media (Tatlow-Golden, 2016). The associated WHO report recommends governments should define "marketing directed at children" and parameters around the legal age at which digital marketing of unhealthy foods can be permitted (Tatlow-Golden, 2016). A Child Health Protection Act introduced in Canada (2016) has proposed the prohibition of advertising unhealthy food and beverages to children must specifically define "advertising directed primarily at children" (Government of Canada, 2018). In particular, this requirement constitutes extensive and flexible definitions for child-directed settings, child-directed media channels, and advertising techniques with child appeal. Under new regulations anticipated to be enacted in Canada in 2019, marketing to children is likely to be prohibited in "child-directed settings" including day-care and concerts, and restricted on "child-directed media channels". There is thus a need when designing policy specifications to define advertising techniques with child appeal. In light of this, this thesis captured the contemporary marketing techniques and vehicles of promotion of appeal to children.

## 1.2 Aim

Empirical evidence indicates a plethora of detrimental impacts results from exposure to food marketing. The Hierarchy of Effects model developed from a review of studies assessing the impact of food marketing on children proposes a cascade of effects delineating how food marketing ultimately influences children's weight and contributes to obesity (Kelly et al., 2015a). This model designates specific stages of the consumer journey with food marketing.

Development of this model identified gaps in existing knowledge, along with suggestions for further policy-relevant research. Suggestions were made regarding study design, including the need for combining quantitative and qualitative measures to enable a better understanding of children's attitudes towards food promotions and their effects. Study materials were also recommended; to use measures appropriate to the cognitive abilities of children (avoidance of reading or writing tasks) and to eliminate the effect of pre-existing conceptions about market products by using mock or unfamiliar brands (Kelly et al., 2015a). Finally, a dearth of evidence on the impact of new media was identified (Kelly et al., 2015a). A systematic review, which included experimental research conducted up to September 2018, confirmed these gaps in the research (Chapter 2) and therefore they remain key priority areas for research.

This thesis aimed to contribute novel evidence on the influence of unhealthy food marketing on children's food attitudes and preferences by focusing on these identified gaps in knowledge, and in turn, explore the implicit and explicit mechanisms underlying food marketing.

## 1.3 Research Questions

This thesis answered three specific research questions:

1. What are the explicit associations and attitudes that children have to branded food products, including to their own favourite products and a hypothetical product?

2. How do children's attitudes to their favourite branded food products manifest physiologically?
3. How do contemporary game design techniques used to market an unfamiliar food product influence children's attitudes, preferences and consumption?

## 1.4 Significance of research

Globally and in Australia, the marketing of unhealthy food continues at high levels, wielding great influential power over children, which leads to detrimental health outcomes. This warrants strong government regulatory reform to restrict food advertising to children (Hickey, 2018, Lobstein et al., 2015, Lumley et al., 2012, Obesity Policy Coalition and The Global Obesity Centre, 2017, Watson, 2014). This thesis contributes novel evidence to demonstrate the power of food marketing on children, in turn contributing to this case for restricting food marketing to children. The current studies adopted a holistic approach by investigating both the implicit and explicit mechanisms underlying the food brand – child consumer dynamic. These three research studies addressed the identified research gaps. This research holds significance because of the novelty each study brings and its contribution to the gaps in the evidence.

A dearth of research on the impact of food marketing uses a qualitative methodology, particularly child-centered and child appropriate measures. Therefore, Study One used qualitative research and child-centered activities, to illuminate knowledge by the use of participant-developed stimuli – an important

modification from the customary researcher nominated-stimuli. As children are at the centre of these potential policy changes, it was vital to use participant-developed stimuli to ensure the study was considerate and reflective of their real experiences. This study highlighted the influence of multiple exposures to food marketing as it explored the impact of real-life exposures and children's real-life connections to relevant food brands. In identifying the marketing techniques children are most responsive to, the findings provide a guide to the foci for policymakers.

Novel physiological research was conducted in Study Two to evaluate children's attitudes to their favourite food brands. Prior to this study, research primarily captured explicit responses to marketing, such as the measurement of brand attitudes through questionnaires. The physiological measure provided a 'true' response and was appropriate for use with children as it bypassed issues such as social desirability or a child's ability to articulate their thoughts. This measure was successful in the detection of an implicit response to branding.

Finally, this thesis provides needed research on food marketing using new media (specifically online gaming). A randomised controlled trial exposed children to advertising of an unfamiliar confectionary brand, delivered via various techniques in an online gaming context. This included an advertising technique very popular amongst the games children play but not yet evaluated from a critical public health perspective. This study successfully highlighted the techniques that influenced children's attitudes and preferences. Overall, this thesis comprehensively addresses several gaps in the research and provides

unique and complementary research findings to the broader body of evidence.

## 1.5 Thesis outline

This thesis is presented as a compilation of four manuscripts, all of which are currently under review for publication in peer-reviewed journals.

*Chapter Two* presents a systematic literature review undertaken in 2018. It presents the latest findings on the influence of food marketing on children's attitudes, preferences and consumption. The most recent review of these outcomes was published in 2013, using evidence up to 2008 (Cairns et al., 2013), therefore an updated appraisal was necessary. This review synthesises the evidence on the impacts of food marketing on children. It also evaluates the methodology used to conduct this type of research and the discussion identifies research gaps and provides suggestions for future research. These gaps in knowledge highlight the relevance of this thesis due to the continued dearth of evidence identified in specific areas.

*Chapter Three* provides the theoretical framework that informed the study design and a narrative of the methodology used within this thesis. The Dual Processing Theory in this chapter details how marketing operates across two mental pathways and highlights the relevance and importance of exploring both the implicit and explicit impacts of exposure to food marketing. This theory provides the principal basis for the thesis. Other theories outlined in this chapter include attachment theory, implicit self-theories, and priming theory. Also included in the chapter are narrations of the importance of using varied

methodological approaches and how to conduct explorations of new media.

The following chapters (Chapters Four, Five and Six) comprise empirical studies designed to address these research gaps. These studies include the implementation of a range of methodologies (qualitative and quantitative – using physiological measures) and investigate the impact of emerging media (advertising techniques used in online gaming contexts).

*Chapter Four* presents Study One and addresses Research Question 1, which investigated children's explicit associations with and attitudes about branded food products through the implementation of child-centered qualitative methodology. This study involved two child-centered activities and the inclusion of participant-developed stimuli.

*Chapter Five* presents Study Two and addresses Research Question 2, which aimed to identify children's implicit responses to branded products. Attachment theory and implicit self-theories informed this study. An implicit response to the children's favourite branded products was investigated using electrodermal activity to indicate arousal.

*Chapter Six* presents Study Three and addresses Research Question 3, which aimed to explore the influence of food marketing using contemporary advertising techniques in online games. Priming theory informed this study. An unfamiliar food brand was used as the stimuli, as recommended by previous research. The findings detailed in this chapter report the influence of advertising

techniques used in online gaming contexts on children's food attitudes, preferences and consumption.

Finally, *Chapter Seven* compiles the major findings of the systematic review and three research studies, proposing their relevance within the evidence base for informing regulation. It summarises the current marketing landscape and its injurious impact on children's health. Opportunities for further research also are discussed.

## 1.6 Chapter summary

This introductory chapter presented the topic of the thesis and offered a detailed description of the background, research gaps, and context for the studies. It also highlighted the importance of contributing to and building the strong evidence base required to stimulate legislative changes to restrict the marketing of unhealthy food to children. The thesis style, aims and research objectives were also outlined, with a brief description of the comprising chapters. The following chapter presents a recent systematic review of the existing literature, and in identifying the gaps in the research, demonstrates the relevance of the research studies constituting this thesis.

# 2.0 CHAPTER TWO - LITERATURE REVIEW

## 2.1 Preface

Children's aptitude in digital media, paired with their natural credulity, lack of cognitive defences and commercial inexperience, make children the most coveted demographic for marketers (Garde, 2018). As a result, they are vulnerable targets of the food manufacturing industry and are highly exposed to the marketing of unhealthy foods (Kelly et al., 2015b, Signal et al., 2017). The WHO have recognised children's exposure to marketing of unhealthy food as a global health priority (World Health Organization, 2010).

A lack of evidence linking food marketing and childhood obesity has been cited as the key reason for the government policy inertia in Australia (Australian Communications and Media Authority, 2009b). This decision remains current owing to the absence of a re-evaluation of the evidence base using contemporary evidence. The body of evidence comprising the review that informed the decision made by the Australian Communications and Media Authority (ACMA) was produced in 2009, nearly a decade ago (Australian Communications and Media Authority, 2009b). In addition, a systematic review of international evidence that includes the impact of food marketing on children's attitudes, preferences, and consumption has not been published since 2013 (which used data up to 2008) (Cairns et al., 2013). This prolonged interval emphasises the need for a comprehensive review of the current body of evidence. This chapter presents a systematic literature review conducted in 2018

that focuses on the influence of food marketing on children's attitudes, preferences and consumption.

**Citation:** Smith R., Kelly B., Yeatman, H., & Boyland, E. (2019). Food marketing influences children's attitudes, preferences and consumption: A systematic critical review. *Nutrients, 11,* 875.

**Author's contribution: RS** registered the systematic review with PROSPERO. **RS** screened the titles and abstracts for relevance. **RS** and a research assistant independently screened the full-length texts, assessed the quality of the studies and shortlisted the articles to be included in the review by consensus. BK reviewed articles where consensus could not be reached. **RS** and a research assistant extracted data from the included studies. **RS** conducted and interpreted the analysis, drafted and revised the manuscript. **RS**, BK, HY and EB reviewed and edited the manuscript and approved the final version.

## 2.2 Manuscript – Food marketing influences children's attitudes, preferences and consumption: A systematic review

### 2.2.1 Abstract

Exposure to the marketing of unhealthy foods and beverages is a widely acknowledged risk factor for the development of childhood obesity and non-communicable diseases. Food marketing involves the use of numerous persuasive techniques to influence children's food attitudes, preferences and consumption. This systematic review provides a comprehensive contemporary

account of the impact of these marketing techniques on children aged 0-18 years and critically evaluates the methodologies used. Five electronic academic databases were searched using key terms for primary studies (both quantitative and qualitative) published from January 1970 up to September 2018; 71 eligible articles were identified. Significant detrimental effects of food marketing, including enhanced attitudes, preferences and increased consumption of marketed foods were documented for a wide range of marketing techniques, particularly those used in television/movies and product packaging. Together these studies contribute strong evidence to support the restriction of food marketing to children. However, the review also signposted distinct gaps: firstly, there is a lack of use of qualitative and physiological methodologies. Secondly, contemporary and sophisticated marketing techniques used in new media warrant increased research attention. Finally, more research is needed to evaluate the longer-term effects of food marketing on children's weight.

### 2.2.2 Introduction

Globally, the prevalence of overweight and obesity has risen dramatically amongst children aged 5-19 years, from 4% in 1975 to 18% in 2016 (Abarca-Gómez et al., 2017). As obesity in childhood is known to track into adulthood (Evensen et al., 2016), this highlights a cohort of 41 million children with the potential to become adults with overweight and obesity with serious implications for health. Obesity, a disease in itself, is also a modifiable behavioural risk factor for long-term non-communicable diseases (NCDs), such as cardiovascular diseases and some cancers (World Health Organization, 2017, World Health Organization, 2018b), thus early intervention is critical.

Obesity is arguably a natural response to the modern food environment (Swinburn et al., 2011), where the marketing and advertising of inexpensive, highly palatable, energy-dense foods and beverages is omnipresent (Boyland and Whalen, 2015, Swinburn et al., 2011). The techniques used to market unhealthy foods to children are extensive, sophisticated and persuasive (Boyland and Halford, 2013, Boyland et al., 2012) and operate on different vehicles of promotion (e.g. product placement on television). Analysis of children's environments indicate persuasive marketing has a particularly strong presence on television (Kelly et al., 2007), websites (Potvin Kent and Pauzé, 2018) and games (Lee et al., 2009), and extends its promotion to supermarkets (Harris et al., 2010) and outside schools (Kelly et al., 2008b), resulting in minimal un-commercialised space.

Children are particularly susceptible to persuasive messages used in marketing communications, as their cognitive development (cognition that allows one to recognise the selling and persuasive intent of marketing communications) is relatively limited (Rozendaal, 2010). For example, young children in the 'pre-cognition' stage of cognitive defence, are unable to differentiate television advertising and television programme content (Carter et al., 2011). Children are more likely to interpret marketing as factual (Ludvigsen and Scott, 2009). Younger children are known to interpret advertising as assistive information to ensure they are up-to-date with what is available in the shops (Ludvigsen and Scott, 2009). Therefore, it could be argued marketing exploits children's cognitive limitations and so is both inherently unfair (Kunkel et al., 2004) and a

breach of children's rights to appropriate information as stated in Article 17 of the United Nations Convention for the Rights of the Child (United Nations General Assembly, 1989).

Acute and accumulative exposures to food marketing influence children's thoughts and behaviours, in particular, their attitudes, preferences and consumption of unhealthy commodities (Boyland, 2016, Obesity Policy Coalition and The Global Obesity Centre, 2017, World Health Organization, 2016). These three factors are key components of a cascade of effects of marketing that may lead to childhood overweight (Kelly et al., 2015a). The most recent systematic assessment of the evidence on all three of these proximal outcomes, published in 2013, included literature from 1970 up to 2008 (Cairns et al., 2013). Thus, there is nearly a decade of new research to be evaluated. Moreover, previous studies have noted methodological gaps in the body of evidence, such as a need for child-appropriate study measures and in-depth qualitative data to complement quantitative information (Kelly et al., 2015a). Recent meta-analyses focused on consumption outcomes also noted substantial methodological heterogeneity for the quantitative studies (Boyland, 2016, Sadeghirad et al., 2016).

This review aimed to provide a contemporary account of the impact of food marketing on children's food attitudes, preferences and consumption. It aimed to do this by using the same search period starting point as the most recent review (1970) and evaluate studies up to 2018, to cover the literature to date. It also aimed to explore the methodologies used in the identified studies to

determine salient gaps in the research. The key areas of enquiry in this review informed the following research questions:

1) What are the impacts of different food marketing techniques on children's (0-18 years) food attitudes, preferences and consumption?
2) What methodologies and marketing techniques have been studied to evaluate the impact of food marketing on children's (0-18 years) food attitudes, preferences and consumption?
3) Are there opportunities to further explore the impact of food marketing techniques on children's (0-18 years) food attitudes, preferences and consumption?

### 2.2.3 Materials and methods

The systematic review protocol was registered with the PROSPERO International Prospective Register of Systematic Review (PROSPERO, 2018) prior to inception (ID CRD42018107429) and is reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Moher et al., 2009). The lead researcher (RS) independently searched the following five academic electronic databases during September 2018: SCOPUS (https://www.scopus.com/), PsycINFO (http://www.apa.org/pubs/databases/psycinfo/index.aspx), MEDLINE (https://www.ncbi.nlm.nih.gov/pubmed/), Business Source Complete (https://www.ebsco.com/products/research-databases/business-source-complete), and Web of Science (http://apps.webofknowledge.com). The following Boolean search strings were used: (market* OR persua* OR advert* OR commercial OR promot* OR technique OR brand*) AND (child* OR

adolescen* OR “young people” OR teen OR “junior high” OR “primary school” OR “high school” OR “secondary school” OR youth OR boys OR girls OR camp OR parent*) AND (food OR drink OR beverage OR snack OR juice OR soda NOT alcohol*) AND (consum* OR attitude OR choice OR intake OR prefer*). Articles were required to adhere to the following criteria: they were peer-reviewed journal articles, published in English, and were published in the period 1970-2018. Whilst the review focused on outcomes measured in 0-18 year-olds, parents were included in the search terms to account for studies in which they may have responded on behalf of young children or completed assessments/questionnaires. A manual search of reference sections in eligible articles supplemented the formal electronic searches.

*2.2.3.1 Study selection*

Eligibility criteria required primary research that explored the influence of one or more marketing technique(s) on one or more of children’s (0-18) attitudes, preferences or consumption of food or beverages. Criteria extended to both quantitative and qualitative primary studies to capture all methodologies. Figure 2.1 illustrates the systematic literature search. Potential material was exported into EndNote X8 (Clarivate Analytics, 2018) and duplicates were removed. The lead reviewer (RS) pre-screened the title and abstract of the identified references for relevance. Secondary studies such as systematic reviews and content analysis articles were not included. Exclusion criteria precluded studies that: focused on examining marketing techniques to promote good nutrition or studies focused on outcomes other than attitudes, preference or consumption such as purchasing requests or body weight. Two independent reviewers (RS

and a research assistant) assessed each of the full-text articles against the inclusion and exclusion criteria. A third reviewer (BK) was consulted when there were discrepancies between the two reviewers and a consensus was reached through discussion.

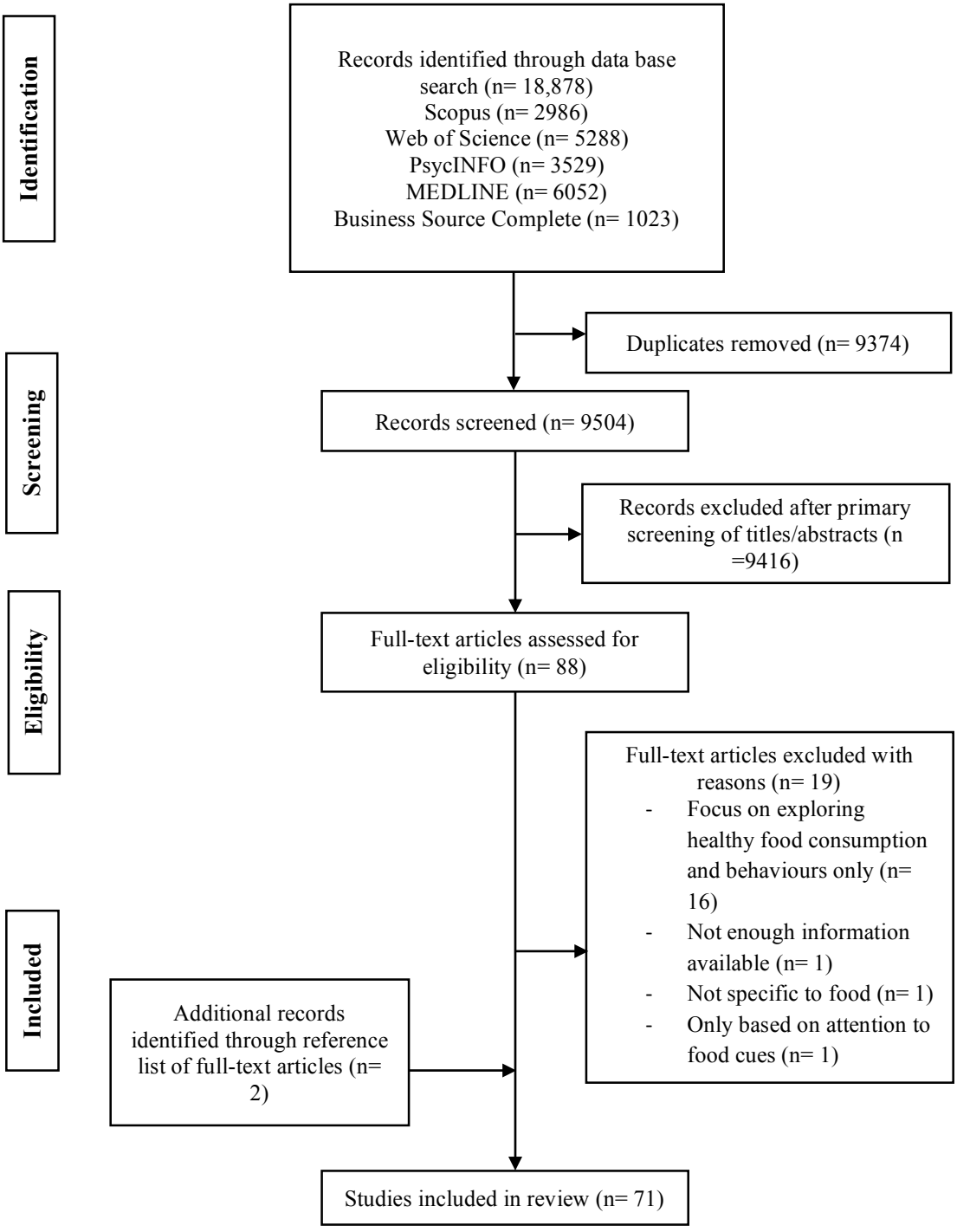


**Figure 2.1 PRISMA flow chart of the systematic review literature search**

*2.2.3.2 Data extraction*

RS and a research assistant extracted and recorded in a tabulated summary. Details recorded included the date, location, objectives, study design, sample size, demographics, procedure, main marketing technique evaluated, outcome measures, and primary outcomes. Due to the heterogeneity of the studies, a qualitative narrative synthesis was used to communicate the overall conclusions of the studies. RS and a research assistant both separately conducted a quality assessment on the selected articles using the NIH (National Institute of Health) tools (National Heart, 2014) for quantitative studies, and the CASP (Critical Appraisal Skills Program) (Critical Appraisal Skills Programme, 2017) for qualitative studies. Each appraisal tool assessed four domains: study setup, participant selection, assessment and data analysis, and each study was given a rating of either good, fair or poor.

### 2.2.4 Results

The database searches identified 18,878 records, of which 9,504 remained after the removal of duplicates. Seventy-one articles met the inclusion criteria (see Figure 2.1) (Data extraction tables available in Appendix V).

*2.2.4.1 Marketing techniques evaluated*

Six key marketing techniques and platforms for marketing were identified (broad topics included: television/movies, packaging, digital games, endorsers, print advertising and the internet). Table 2.1 documents the outcomes assessed and the quality of evidence. The outcomes spanned the three proximal outcomes

of interest and the outcome 'preference' included studies which assessed preference by choice from a selection of items.

**Table 2.1 Marketing technique or vehicle of marketing studied, outcome(s) assessed and the quality of the evidence**

| *Marketing Technique or Vehicle of Marketing* | **Outcome Assessed** | | | **Quality of Evidence** |
|---|---|---|---|---|
| | **Attitudes** | **Preferences** | **Consumption** | |
| **Television/movies** | | | | |
| Television commercials for unhealthy products | (Dixon et al., 2007, Gorn and Goldberg, 1982, Harris et al., 2018, Neyens et al., 2017, Panic et al., 2013, Uribe and Fuentes-García, 2015) | (Boyland et al., 2015, Bruce et al., 2016, Chernin, 2008, Esmaeilpour et al., 2018, Ferguson et al., 2014, Ferguson et al., 2012, Gatou et al., 2016, Goldberg et al., 1978, Gorn and Goldberg, 1980, Gorn and Goldberg, 1982, Halford et al., 2008a, Halford et al., 2008b, Halford et al., 2004a, Halford et al., 2007, Harris et al., 2018, Neyens et al., 2017, Pettigrew et al., 2013, Resnik and Stern, 1977, Ülger, 2009, Uribe and | (Anderson et al., 2015, Anschutz et al., 2009, Anschutz et al., 2010, Emond et al., 2016, Gilbert-Diamond et al., 2017, Gorn and Goldberg, 1980, Gorn and Goldberg, 1982, Halford et al., 2008b, Halford et al., 2004a, Halford et al., 2007, Harris et al., 2009b, Harris et al., 2018, Norman et al., 2018) | 16 x good<br>12 x fair<br>3 x poor |

| | | | | |
|---|---|---|---|---|
| | | Fuentes-García, 2015) | | |
| Product placement/movie tie-ins | (Dixon et al., 2017, Matthes and Naderer, 2015) | (Auty and Lewis, 2004, Dixon et al., 2017, Matthes and Naderer, 2015, Toomey and Francis, 2013) | (Harris et al., 2009b, Matthes and Naderer, 2015) | 3 x good<br>2 x fair |
| **Packaging** | | | | |
| Promotional characters | (Arrúa et al., 2017, Letona et al., 2014, McGale et al., 2016, Smits and Vandebosch, 2012) | (Ares et al., 2016, Kotler et al., 2012, Lapierre et al., 2011, Letona et al., 2014, McGale et al., 2016, Ogle et al., 2017, Roberto et al., 2010, Ülger, 2009) | (Kotler et al., 2012) | 6 x good<br>4 x fair |
| Branding | | (Elliott et al., 2013, Kellershohn et al., 2018, Robinson et al., 2007) | (Forman et al., 2009, Keller et al., 2012) | 4 x good<br>1 x fair |
| Toys | | | (Gregori et al., 2013, Gregori et al., 2014) | 2 x good |
| Labelling/colour | | (Ares et al., 2016, Dixon et al., 2014, Marshall et al., 2006, Miller et al., 2011) (Josion-Portail, 2011)$_{qual}$ | | 1 x good<br>4 x fair |
| **Digital games** | | | | |
| Advergames | (Folkvord et al., 2013b, Folkvord et al., 2014, | (Folkvord et al., 2013b, Harris et al., 2012, | (Folkvord et al., 2013b, Folkvord et al., 2014, | 8 x good<br>4 x fair |

| | | | | |
|---|---|---|---|---|
| | Harris et al., 2012, Neyens et al., 2017, Panic et al., 2013, Redondo, 2012, Rifon et al., 2014, Vanwesenbeeck et al., 2017) | Mallinckrodt and Mizerski, 2007, Neyens et al., 2017, Putnam et al., 2018, Rifon et al., 2014) | Folkvord, 2015, Folkvord et al., 2017, Harris et al., 2012, Norman et al., 2018) | |
| **Endorsers** | | | | |
| Celebrities | (Smits and Vandebosch, 2012) | (Dixon et al., 2014) | (Boyland et al., 2013) | 2 x good<br>1 x fair |
| Animated characters | | (Putnam et al., 2018) | | 1 x good |
| **Print advertising** | | | | |
| Magazines | (Jones et al., 2010)$_{qual}$ (Jones and Kervin, 2011) | (Jones and Kervin, 2011, King and Hill, 2008) | | 2 x good<br>1 x fair |
| **Internet** | | | | |
| Social media | | (Pettigrew et al., 2013) | | 1 x good |
| Online advertisements | | (Tarabashkina et al., 2016) | | 1 x good |

*2.2.4.2 Description of studies*

Study participants' ages ranged from 2-17 years and nearly all studies used a mixed-sex sample, with the exception of one study that was males only (Gorn and Goldberg, 1980). The majority of studies were conducted in North America (n = 23), followed by the UK (n = 14), Australia (n = 9), The Netherlands (n = 6), Canada (n = 4) and 12 other countries. Sixty-eight studies used a quantitative methodology and three studies used a qualitative methodology (indicated in Table 2.1). The quantitative studies employed either between subjects (n = 52) or within subjects (n = 16) designs. A majority of the quantitative studies measured acute (one-time) exposures to food advertising (n = 62) and a few

investigated the impact of cumulative food marketing exposure (n = 6), with exposure periods ranging from 2-16 days. The three qualitative studies implemented interviews with friendship pairs (Jones et al., 2010) and one-on-one interviews (Josion-Portail, 2011, Kellershohn et al., 2018).

*2.2.4.3 Coverage and impact of marketing techniques*

Table 2.1 indicates the three most commonly studied marketing techniques involved television/movies (n = 36), packaging (n = 22) and digital games (n = 13). The impact of television commercials, particularly the influence of exposure on preferences and consumption had been studied the most (n = 31). Common outcomes of exposure to television and movie marketing of unhealthy foods included consuming significantly more advertised and non-advertised food (relative to those who were not exposed or were shown healthier alternatives/non-food advertisements), and increased positive attitudes toward and more frequent choices of the advertised food or unhealthier foods. For example, a television commercial study deemed to be of high-quality, embedded food or toy commercials into a television programme and provided participants with the opportunity for *ad libitum* snacking during the show with the inclusion of the advertised food (Gilbert-Diamond et al., 2017). It revealed that participants who viewed the food advertisements consumed an average of 48 kilocalories more of the advertised food than those who viewed toy advertisements ($p$ <0.1) (Gilbert-Diamond et al., 2017).

A substantial number of studies on the influence of packaging were identified, particularly with a focus on preference (including food choice) (n = 22). Many

of these studies demonstrated the persuasive nature of promotional characters and labelling used on the packaging of food products. For example, a study given a high-quality rating in this review, asked children to rate their taste preferences and preferred snack choice for three matched food pairs, presented either with or without brand-equity characters (characters developed specifically to represent a brand) on the packaging (McGale et al., 2016). Children were significantly more likely to prefer the taste ($p$ <0.1) and were more likely to choose the item in packaging with these characters (73% of children) compared with a matched food without the characters ($p$ <.001) (McGale et al., 2016).

The impact of digital games was the third most frequently evaluated marketing technique (n = 13) and was explored chiefly by exposing children to advergames. Advergames provide a brand-rich video game environment (Giallourakis, 2009), where the brand and/or product is a prominent feature (Schwartz et al., 2013). They have become a popular platform for advertisers to connect with children online (Culp et al., 2010). The evidence base for the influence of food marketing within advergames has a nearly equal number of studies for the measurement of all three outcomes. The studies used advergames with durations ranging from 2-12 minutes, commonly followed by an assessment for attitudes and the opportunity for *ad libitum* snacking. The marketing of unhealthy foods through advergames significantly increased children's consumption of unhealthy food ($p$ <.03) (Harris et al., 2012), and when children were exposed to both advergames and television commercials, advergames generated the most positive brand attitudes ($p$ <.001) (Neyens et al., 2017).

Some of the studies in Table 2.1 also investigated factors that may mediate the impact of marketing techniques such as: a protective message (Folkvord et al., 2017), attentional bias (Folkvord, 2015), weight status (Boyland et al., 2007, Forman et al., 2009), genetics (Gilbert-Diamond et al., 2017), parental influence (Anschutz et al., 2010, Ferguson et al., 2014, Ferguson et al., 2012), developmental stage and gender (Chernin, 2008, Ferguson et al., 2014), and health knowledge (Esmaeilpour et al., 2018). These studies indicated a fast latency to initial fixations to food cues ($p$ = 0.5), heavier weight status ($p$ =.05 and $p$ =.04), and FTO risk alleles ($p$ =.02) all increased food consumption in children (Folkvord, 2015, Forman et al., 2009, Gilbert-Diamond et al., 2017, Halford et al., 2008b). Food marketing was also more likely to influence the food preferences of boys than girls ($p$ = 0.03) (Chernin, 2008). Some findings showed a moderating impact of parental influence (Anschutz et al., 2010, Ferguson et al., 2014) and activation of health knowledge ($p$ = 0.03) (Esmaeilpour et al., 2018), but overall the influence of food marketing was not mediated by a protective message (Dutch children $p$ = 0.1 and Spanish children $p$ = 0.2), parental influence ($p$ > .05, $p$ > .05 and $p$ = 0.7), or age ($p$ = 0.3) (Chernin, 2008, Ferguson et al., 2012, Folkvord et al., 2017).

*2.2.4.4 Gaps in marketing techniques explored*

Fewer studies investigated the impact of endorsers (n =4), print advertising (n = 3) or the internet (n = 2), and only one study measured the outcome of consumption. The sole study that explored the impact of endorsers on consumption was given a high-quality rating in this review and found the

presence of a sports endorser led children to consume significantly more food than children who were not exposed to the endorsed material ($p$ <.001) (Boyland et al., 2013). The available studies on print advertising and the internet predominantly revealed a strong influence of these techniques on children's attitudes and preferences. For example, one study given a fair rating in this review, investigated the impacts of magazine advertisements and found participants generally showed positive attitudes towards magazine marketing (Jones and Kervin, 2011). Those exposed to food advertisements in the magazines were more likely to choose the advertised items when making a subsequent food choice compared to those who saw no food advertising ($p$ =.04) (Jones and Kervin, 2011). Two studies explored the impact of internet advertisements and the use of social media and found such advertising influenced children's preferences ($p$ <.001) and food choice ($p$ = 0.6) (Pettigrew et al., 2013, Tarabashkina et al., 2016). Lastly, it is worth noting that whilst there were more studies focused on the influence of digital gaming, the methodology used was limited because only exposure to advergames was measured i.e. investigating the impact of exposure to games with food or brands embedded into the game itself (presence or absence). Thus no research investigated other techniques used in online games played by children.

*2.2.4.5 Design and methodological gaps*

Many of the studies took similar approaches to the measurement of attitudes, preferences and consumption, such as administering questionnaires or scales, allowing the participants to make a real or hypothetical food choice, and measuring *ad libitum* intake of provided foods. Very few studies investigated

these outcomes using extraneous methods, such as measuring physiological outcomes of exposure. Three studies implemented additional measures to investigate the potential mechanisms underpinning exposure effects (Bruce et al., 2016, Folkvord, 2015, Ogle et al., 2017). For example, eye-tracking has been used to measure attentional bias, in which an interaction between the type of advergame and the latency of initial fixation to food cues influenced consumption of snacks (Folkvord, 2015). Children with a faster latency of initial fixations in the energy-dense advergame had a higher total intake (189.2 kcal) than those who played the nonfood advergame (131.2 kcal) ($p < .05$) (Folkvord, 2015). Functional resonance imaging has also been applied as a measure to understand food choice (Bruce et al., 2016). It has shown increased brain activity in a reward region of the brain when children were making food choices after food marketing exposure ($p < .05$) (Bruce et al., 2016).

The review identified a strong emphasis on quantitative studies, with only two qualitative studies available. A study given a high rating in this review used friendship pairs and revealed that children claimed to like licensed characters on products because "all my favourite stuff is on it" (Jones et al., 2010). This is a useful insight and could be used, for example, in complementing the experimental studies that have shown promotional characters are influential on children's preferences (Kotler et al., 2012, Letona et al., 2014, McGale et al., 2016, Ogle et al., 2017, Roberto et al., 2010).

There was a deficiency of studies that explored the long-term impact of marketing techniques on any outcome (n = 6). One study, given a high rating by

this review, exposed children to either television commercials, or a combination of television commercials plus advergames (multi-media) over a period of 6 days (Norman et al., 2018). This study successfully detected that children did not compensate for eating more after exposure to advertising, leading to an additional daily food intake of 194kj ($p < .001$) (Norman et al., 2018). It revealed all children in the multiple-media condition ate 182kJ more ($p < .01$) compared to children who were exposed to a single-media source (Norman et al., 2018).

The majority of the studies in this review investigated the influence of marketing unhealthy food products using stimuli selected by the researchers (n = 70). This did not guarantee the stimuli used would appeal to the participant sample. Studies often used well-known brands, and marketing content commonly used to promote to children, such as that retrieved from well-known advertisements, shown during television hours popular with children. Only one study showed the participants a selection of brands and asked them to identify the brands they had an interaction or connection with in the real world, which were then used as the study stimuli (Letona et al., 2014). Even in this case, the researchers had decided the selection of brands from which the children would choose. Similarly, few studies used brands assumed to be unfamiliar to the children (n = 2), demonstrated to be useful to investigate the effect of exposure in the absence of existing associations or preferences.

### 2.2.5 Discussion

This review has provided a complete overview of the literature to date, by using

the same search timings as the original Cairns review (1970-2008) (Cairns et al., 2013), plus the decade of research that has been conducted since (2008-2018). Overall, the identified studies present a strong, comprehensive body of evidence demonstrating the powerful influence of food marketing exposure. The studies also identify the influences on children's attitudes, preferences and consumption of the vehicles of promotion and associated techniques, particularly with regard to television commercials, and the marketing techniques used in packaging of products. The review signposts the vehicles of promotion and marketing techniques that require further assessment, and the importance of further research to strengthen the current body of evidence.

A lack of evidence linking food marketing to childhood obesity is an oft-cited reason, by both governments (Australian Communications and Media Authority, 2009b, Hoek, 2005) and the food industry (Coalition on Food Advertising to Children, 2007), for the limited action to restrict children's exposure to unhealthy food marketing. This review of the body of evidence indicates otherwise. It has documented a strong link between food marketing to childhood obesity. The findings of this review support further restriction of food marketing to children as a key solution for the management of childhood obesity (Lobstein et al., 2004, World Health Organization, 2016).

*2.2.5.1 Strengths and weaknesses of selected studies*

The majority of the reviewed studies were assigned either good or fair ratings. The studies' main strengths were in the exposure and assessment methods used. Their weaknesses were most visible in the participant sample used (i.e. not

using random sequence generation, a less-generalisable sample, and non-reporting of sufficient statistical power in the sample size). There is a possibility of publication bias that studies which did not find any signification associations may not have been published, however, this was formally tested with intake studies in 2016 and no evidence was found of publication bias (Boyland, 2016).

*2.2.5.2 Priority areas identified for future research*

This review identified areas of future research to strengthen the body of evidence. These consisted of additional methodology and investigating additional marketing techniques which are detailed in Table 2.2.

Marketing communications aim to influence children's thoughts and behaviours via both the implicit and explicit memory, thus some messages are consciously recognised when processed, and some are processed automatically without conscious awareness. Therefore, for researchers seeking to quantify the behavioural impact of marketing, it is crucial the methodology used is appropriate to the type of exposure assessed and the relevant measurable outcome. For example, for overt marketing, it may be most appropriate to capture explicit articulation or attitude ratings, but with covert marketing exposure, it may be beneficial to observe physiological behavioural responses. This is especially relevant as studies noted an increasing use of marketing techniques designed to influence children's implicit memory (Folta et al., 2006, Jenkin et al., 2014). Research into these implicit and physiological responses is extremely valuable for expanding knowledge about the individual and automatic

responses food marketing can prompt. Research with children, who may have more difficulty expressing themselves than adults (Pine and Veasey, 2003, Uribe and Fuentes-García, 2017), requires appropriate methodology and the use of a range of implicit and explicit techniques to ensure findings are not reliant on the children explicitly expressing their reaction. Such studies are vital for attaining a holistic understanding of the impact of food marketing on children. In this review, very few studies implemented a physiological measure to evaluate the implicit influence of food marketing. This is a notable gap in the available evidence.

It is also necessary, particularly when conducting research with children, to explore motivations and reasoning through means other than experimental studies, for example with the use of qualitative studies. Qualitative and child-centered methodology can support children to feel meaningfully involved (Jones, 2008) and may allow researchers to tease apart what specific aspects of marketing resonate most with children. This review only identified two studies that used qualitative methodology. Future research incorporating more qualitative research will add greater insight and weight to the body of evidence.

In all studies, researchers had deemed the exposure stimuli as potentially appealing to children. The materials were often popular global or national brands children were likely to have seen before. This highlights an opportunity for future research. Firstly, children have been described as ‘experts in their own lives’ (Langsted, 1994) and may be the most accurate source for determining appropriate stimuli, especially for studies that seek to measure the

impact of exposure so as to contribute to policy evidence. This is not to say the studies made a mistake in choosing the stimuli, but more studies should champion the use of stimuli informed by the participants, in turn using brands and products considered most relevant to their participants. Secondly, a majority of studies used brands assumed popular with and recognisable by with children. Using unfamiliar brands ensures measurement of exposure outcomes occurs in the absence of existing brand associations and preferences. Future research should seek to use unfamiliar or mock food brands as stimuli.

Furthermore, future research should measure the impacts of accumulative exposure, reflective of the longer-term effects of food marketing and children's exposure to repeated promotions in real life. Two studies in this review investigated whether or not children compensate for advertising-induced snack consumption at subsequent meals (Anderson et al., 2015, Norman et al., 2018). The results identified potential links between advertising and longer-term body weight and health outcomes, evidence vital for informing policy.

Additional marketing techniques for future research foci are of a contemporaneous nature, which likely explains why new media appears to be an understudied area of food marketing. Content analyses examining digital platforms have discovered a vast amount of marketing on popular children's websites (Kelly et al., 2008a, Potvin Kent, 2014), and food brand websites (Kelly et al., 2008a, Weber et al., 2006). However, this review identified very few studies explored the effect of marketing on websites or other digital platforms. The studies exploring social media and internet advertisements found

these forms of marketing to children had detrimental consequences for dietary health and this warrants further research. This is not without methodological and ethical challenges that make identifying and replicating what children are exposed to online a hurdle to overcome (Tatlow-Golden et al., 2017), yet the evidence generated is imperative for informing contemporary policymaking.

Further to a need for more research into the digital environment, there was a bias identified in the approach studies used to measure the influence of online games, as all studies implemented an advergame model. Advergames are very common (Alvy and Calvert, 2008) and are very influential on children, if not more influential than television commercials when compared on the same participants (Neyens et al., 2017, Norman et al., 2018). Therefore, understanding and recognising their influence is vital. However, children are not thought to spend much of their online time on food brand websites where advergames are housed (An and Kang, 2014). It is believed "gaming" as an online phenomenon is on the rise (An et al., 2014) and the games children play contain numerous contemporary advertising techniques, such as pop-up and unlock-to-play advertisements (Meyer et al., 2018). Future research should seek to explore these techniques and establish their impacts, to ensure academic knowledge synchronises with the contemporary marketing environment.

**Table 2.2 Research gaps to be addressed in future studies**

| Additional Marketing Techniques | Additional Methodology |
|---|---|
| Contemporary marketing techniques and vehicles of marketing:<br>- Social media<br>- Internet advertising<br>- Advertising in online games (i.e., pop-up advertisements)<br>- Other new media | Explicit and implicit techniques. These may involve:<br>- Qualitative methods<br>- Child-centred methods<br>- Physiological methods |
| | Stimuli<br>- Stimuli informed by participants<br>- Unfamiliar stimuli |
| | Exposure duration<br>- Accumulative exposures |

### 2.2.6 Conclusions

This review found a strong body of evidence that exposure to food marketing impacts children's attitudes, preferences and consumption of unhealthy foods, with detrimental consequences to health. Current studies provide valuable insights and provide compelling evidence to support the restriction of food marketing to children. Future research to explore contemporaneous marketing techniques, using a wider range of methodologies, could further strengthen this body of evidence.


### 2.2.7 Acknowledgments

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### 2.2.8 Conflicts of interest

The authors declare no conflicts of interest. The Australian Research Council

played no part in the conceptualisation or methodology of this systematic review, the drafting of the manuscript or the decision to submit the paper for publication.

## 2.3 Chapter summary

This chapter presented the 71 identified studies in the systematic literature review that explored the impact of food marketing to children on their attitudes, preferences and consumption. The review was twofold in that it explored both the impact of marketing and the methodological approaches used to investigate this impact. These findings demonstrate the persuasive influence food marketing has on children's attitudes, preferences and consumption, all of which have been identified as risk factors for childhood obesity (Kelly et al., 2015a). Gaps in knowledge were also identified. These included marketing techniques that required further examination, and opportunities for a range of methodologies to be enacted in future research. Specifically identified were the lack of qualitative and physiological methodology and the lack studies that investigated the impact of advertising techniques in games. These were extracted as foci for future research and are addressed in the studies comprising this thesis. The following chapter provides the theoretical framework that informed study design and a narrative of the methodology used within this thesis.

# 3.0 CHAPTER THREE - METHODOLOGY

## 3.1 Preface

As highlighted by the preceding systematic review, current knowledge of unhealthy food marketing to children is evidentiary and the studies demonstrate the influential power marketing poses on children's affective responses and food-related behaviours. Despite a body of robust evidence, the systematic review identified areas requiring further research attention. For example, in order to establish present-day applicability of measured marketing effects, it is essential to assess new and emerging vehicles of promotion and techniques. Moreover, there is a possibility overall knowledge and current conclusions are a product of the methods used, characterised by limited qualitative and physiological research. Gaps in knowledge may create holes in an otherwise powerful case for food marketing regulation and legislation. Consequently, this thesis aimed to capture a wider picture of the unhealthy food marketing landscape and provide further insight into the influence of food marketing techniques on children through 1) implementing a range of innovative methods, and 2) exploring contemporary marketing techniques.

This chapter describes the various methods employed in the current research, which aimed to address the identified gaps in the literature and function as appropriate study designs to execute the overarching research questions. This discourse also provides theoretical commentary and rationalisation for the chosen methodological approaches.

## 3.2 Research approach

The thesis research questions were addressed by the implementation of three key studies that aimed to 1) implement innovative methods, and; 2) investigate contemporary marketing techniques.

### 3.2.1 Epistemology and ontology

The current research applied a pragmatic perspective, whereby the selected methods were led by the proposed research questions. It used an innovative and exploratory approach, so the findings could contribute to a wider comprehension of the area. Specifically, as previous research suggested marketing aims to influence children on both explicit and implicit levels (Ambler, 2008, Folta et al., 2006), more than one methodology was required to enrich knowledge regarding these cognitions and provide broader insight into the investigated issues.

From a critical realism standpoint, to obtain comprehensive knowledge of the influence of food marketing techniques on children, both exposure experiments (empirical realism) and child-centric interviews (relativism) were required in this research.

### 3.2.2 Exploring the explicit and implicit impacts of unhealthy food marketing

Explicit cognition refers to the attitudes and thoughts created about brands or products in response to overt marketing messages to inform consumers (such as

premium offers). These messages are processed and retrieved consciously through explicit memory. The behaviours they inform are accessible to measure in research studies. The word 'explicit' is not to imply the attitudes and thoughts are only identified verbally, as it is possible to assess these in several ways. For example, studies identified in the systematic review investigated the impact of unhealthy food marketing using brand attitude questionnaires (Neyens et al., 2017) and measured observable behaviours linked to advertised foods such as caloric intake (Folkvord, 2015). However, there is scope for methodologies to explore the explicit responses to the influence and impact of marketing techniques in different, innovative and child-centered ways.

Effective marketing communications must operate on a level that also permeates the implicit memory. Information transferred into the implicit memory typically alludes to the ideation of the brand and emotions the consumer may experience from interactions and exposure to the brand. For instance, a popular technique used in unhealthy food marketing campaigns to target school-aged children is the association of 'fun' paired with the brand (Folta et al., 2006). It has been suggested children are most susceptible to the implicit messages in unhealthy food marketing (Nairn, 2008), as messages are transferred non-intentionally (without any effort) into the implicit memory and retrieved non-consciously (Coates, 2006). This can lead to difficulties when extracting the influence of marketing techniques on implicit memory. Methods to obtain the implicit attitudes towards the influence of unhealthy food marketing are invaluable because they reveal 'true responses' (Dimofte, 2010), in that the participants cannot modify or bias their responses.

A full picture of the food marketing landscape and its impact requires a holistic approach whereby both explicit and implicit measures are utilised. The combination of considering the impact on both cognitive processes can facilitate the exploration of further influences food marketing poses, and when paired together creates a strong body of evidence. This thesis explores both the explicit and implicit mechanisms that underpin the potential impact of unhealthy food and drink marketing on children's brand associations and preferences.

## 3.3 Theoretical framework

The theoretical framework for the current research incorporates five psychological theories: Elaboration Likelihood Model (ELM), Attachment Theory (AT), Implicit Self Theories (IST), Priming Theory (PT) and Reactivity to Embedded Food Cues in Advertising Model (REFCAM). Figure 3.1 illustrates how the relevant theories link to each of the empirical studies.

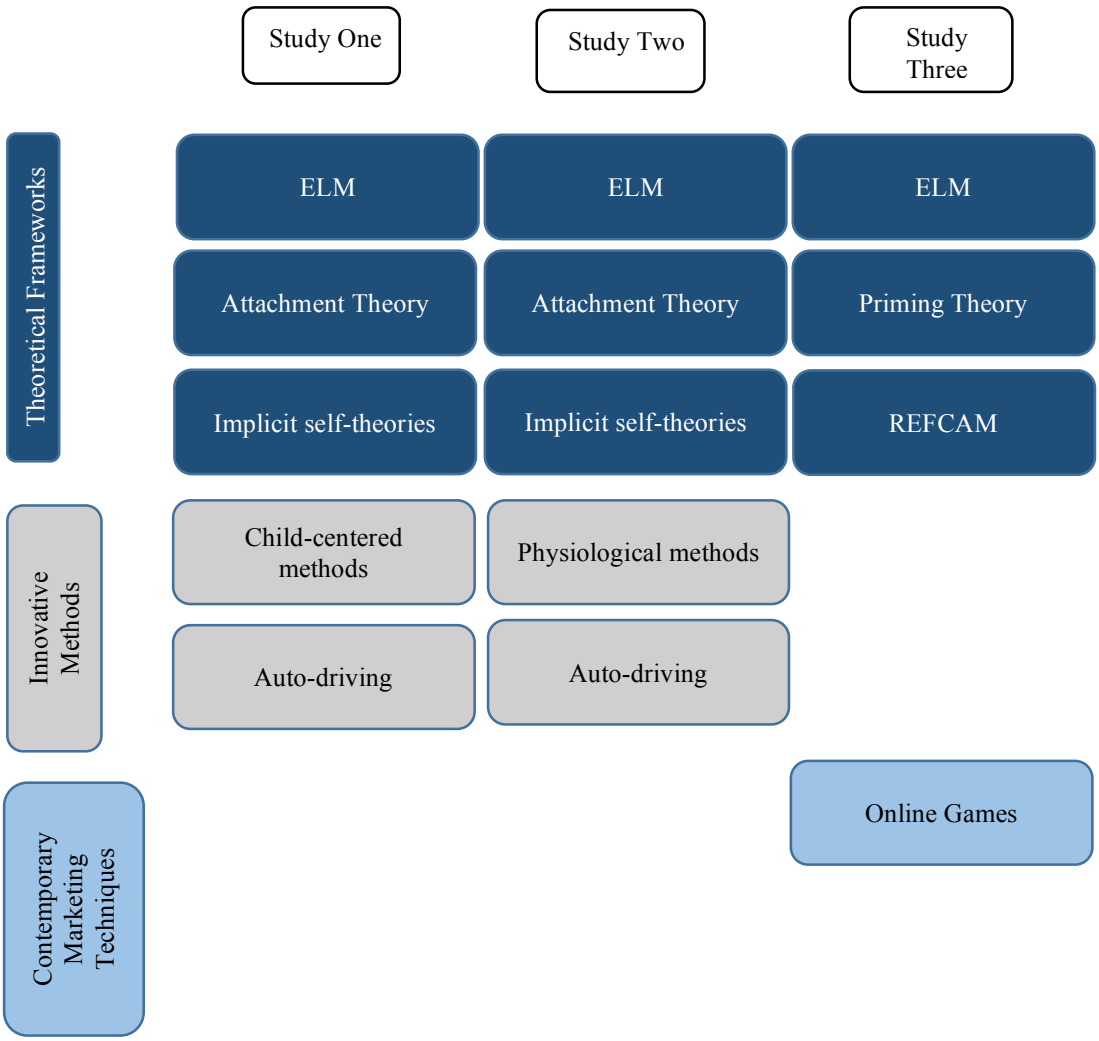


**Figure 3.1 The research studies and the corresponding theoretical frameworks, research aims (innovative methods & contemporary marketing techniques)**

### 3.3.1 The Elaboration Likelihood Model

To understand the relevance of examining explicit and implicit processing, dual processing theories provide a theoretical frame of reference to consider the way information is encountered and received. The Elaboration Likelihood Model

(ELM) (Petty, 1986) proposes a framework for organising persuasive communications. It suggests there are two possible routes of influence: centrally routed messages and peripherally routed messages (Dainton, 2004), which are alternatively referred to as non-automatic or automatic messages (Sherman et al., 2014). Centrally routed messages contain specific information and key points required to interpret the message. Conversely, information communicated peripherally is in the form of cues such as whether the message has an upbeat undertone or whether there are inferred benefits of using the product. Marketers work to ensure their communications are persuasive via both pathways (Folta et al., 2006). For instance, food marketing will frequently target the centrally routed messages with discounted offers and overt claims, whilst also targeting peripherally routed messages with the implied expected outcomes of buying the product (e.g. "you'll feel much happier" or "you'll become more popular"). Drawing upon this theory in the overall study design, across all three studies, aimed to capture the powerful mechanisms used in marketing.

### 3.3.2 Attachment theory

Attachment theory describes the universal phenomenon of a powerful emotional bond between one person and another person of significance to them, traditionally a maternal figure or caregiver (Bowlby, 1969). Less research has explored the prevalence and strength of these attachments extraneous to interpersonal relationships. Research has discovered young children have attachments with inanimate objects such as teddy bears or blankets (Schaffer, 1964). This attachment with non-living entities develops and transforms as the child grows older, demonstrated by a longitudinal study showing 43% of seven-

year-old children slept with an object with which they had an attachment (Mahalski, 1983). It has been suggested attachments may extend to brands (Park, 2006) and feelings of attachment are at the core of strong brand relationships (Fournier, 1998). If brands can determine how to achieve a similar bond with their consumers that resembles a strong attachment, then they will be successful in forming lasting relationships (Thomson, 2006). Strong attachments are likely to result in loyal purchase behaviour over time. Food and drink companies have invested interests in forming relationships with children. This is particularly the case for many packaged processed products, which may not taste drastically different from one another within the same product category. It is, therefore, important to have a loyal consumer base. As the literature shows these brands utilise numerous techniques to foster this relationship, an exploration into the strength of brand relationships could inform the power of the marketing techniques used. Thus, this theory was used to inform the strength and nature of the relationships in Studies One and Two.

### 3.3.3 Implicit self-theories

Marketing is extremely effective when it appeals to the consumer at an individual personality level. Park et al. (2010) theorise brands with 'personalities' are attractive because they provide an outlet for the consumer's personality to be expressed. These personalities may reflect the consumer's perception of their actual self or their ideal self (Park and John, 2010). Entity theorists believe personality traits are fixed, and therefore consumers are most responsive to advertisements congruent with their own personality (Park and

John, 2012). A higher self-congruity to brands has been found to link to higher brand preference and consumer satisfaction (Jamal and Goode, 2001). Whereas, incremental theorists believe personality traits are flexible and consumers respond best to advertisements which promote the 'ideal' self as opposed to the 'actual' self (Park and John, 2012). Incorporating brands into the personality becomes prominent as children simultaneously develop concepts about their view of themselves (Baumeister, 1999; Chaplin, 2005). These connections mature when perceptions of the brands are compatible with the individual's personality (Chaplin, 2005). This is most likely to occur in the period between 7-13 years of age when there is an increase in number and depth of emotional connections with brands (Chaplin, 2005). As a result, participants within this age range presented as the most appropriate age group for this study. This theory was used as a framework for Studies One and Two to assist in understanding the associations and relationships children have with their favourite food and drink brands.

### 3.3.4 Priming theory

Priming is a psychological phenomenon which refers to the facilitative effects of an encounter with a stimulus, subconsciously attended to, on future processing of the same or related stimulus (Tulving, 1982). As such, priming research studies typically follow a methodological configuration which introduces mental representations and associations in a subtle way in one context or phase of the experiment and assesses the potential effects at a subsequent stage in an unrelated context (Bargh and Chartrand, 2000). Priming

is known to influence preference (Birch, 1982, Pliner, 1982), and is particularly effective at influencing attitudes when the stimuli is presented at several occurrences, with 10 exposures identified as the optimum (Schmidt and Eisend, 2015). Repetition, also referred to as 'mere exposure', is a popular strategy within marketing because it is used on the premise repeated exposure alone can increase familiarity and enhances a person's attitude towards the stimuli, therefore increasing the likeliness of purchase (Zajonc, 1968). Food marketing represents a real-world prime, and exposure to food or brand based stimuli is known to influence children's automatic processing at a later stage (Harris et al., 2009b). Therefore it was assumed that the advertised unfamiliar confectionary brand in the online game would act as a prime to influence the children's thoughts and behaviour in Study Three.

### 3.3.5 The Reactivity to Embedded Food Cues in Advertising Model (REFCAM)

The REFCAM (Folkvord et al., 2016) is based on three foundational assumptions. Firstly, it assumes that food cues induce physiological and psychological reactions (Folkvord et al., 2016). Next it combines two communication processing models to provide a better understanding of the effects of food advertising on eating behaviour. These models comprise of the Processing of Commercialized Media Content (PCMC) model (Buijzen, 2010) and the Differential Susceptibility to Media Effects Model (Valkenburg and Peter, 2013). The PCMC model addresses the second foundational assumption, proposing that the effects of food advertising are influenced by the level of cognitive elaboration used to process the cues (Buijzen, 2010). For example, the model contends that the less cognitive elaboration a child uses, the greater the

impact on their eating behaviour (Buijzen, 2010). The third foundational assumption is addressed by The Differential Susceptibility to Media Effects Model (Valkenburg and Peter, 2013) ,which predicts individual differences, such as impulsivity and attentional bias will also determine how children react to food advertising (Valkenburg and Peter, 2013). This framework is especially relevant to the newer forms of advertising, which have increasingly integrating food cues within a media entertainment context (Folkvord et al., 2016). This framework calls for future research to investigate whether these immersive forms of food advertising have a stronger influence on children's eating behaviour than more traditional advertising (Folkvord et al., 2016). Therefore, this framework was used to inform Study Three which explored the effect of contemporary marketing techniques to address this research gap.

## 3.4 Innovative methods

### 3.4.1 Research gap

Previous studies examining the influence and impact of food marketing on children have used a consistent, limited range of methods, usually experimental exposure studies. These methods have critically contributed to the body of evidence. For instance, the measurement of *ad libitum* snacking post exposure has been essential to demonstrate the influence of food marketing on consumption behaviours and choice experiments have been valuable for understanding influence on preference.

However, whilst these methods are robust, the finite range of approaches may have left some aspects of the topic overlooked or under-researched. This thesis

applied innovative and exploratory methods, whose findings could contribute to a wider comprehension of the area. Specifically, as research suggested marketing aimed to influence children on both explicit and implicit levels (Ambler, 2008, Folta et al., 2006), the current studies implemented methods to enrich knowledge regarding the explicit and implicit cognitions of food marketing.

### 3.4.2 Implementation

As a means to address methodological gaps in the research literature, this thesis aimed to implement a range of innovative methods to assist in gaining a comprehensive understanding of the impact of unhealthy food marketing on children. These methods – implemented in Studies One and Two - included: a child-centered methodology, the use of auto-driving as a stimuli-acquisition tool and a physiological method. Further details on Study One and Two are available in Chapters Four and Five.

#### 3.4.2.1 Child-centered methodology

A child-centered methodology was used to gain a broad perspective, eliciting the views of those most affected by food marketing, as children are known to be 'experts in their own lives' (Langsted, 1994). This methodology acknowledges the importance of children's insights and utilises methods easy for children to understand and participate in a meaningful manner (Jones, 2008).

Study One implemented individual interviews and focus groups (of three children) using child-centered methodology to investigate how children interact

with food brands in the current food marketing context. A focus group is defined as a carefully planned discussion, involving group interaction, with the aim to obtain opinions on a defined area of interest (Kitzinger, 1994, Krueger and Casey, 2014). This study aimed to reveal a child's perspective on the marketing techniques most appealing to children, their interaction with branded food products and to identify the influence of food marketing on children's attitudes and associations. The implementation of a focus group carries a host of benefits when working with children, such as a greater elaboration of ideas than individual interviews can provide (Heary and Hennessy, 2006). The inclusion of activities in qualitative research with children is believed to lengthen their concentration period (Gibson, 2007) and provide an alternative way for children to express their ideas (Morgan et al., 2002). These activities consisted of: the children engaging with their photographs taken as part of the Autodriving activity described above, and a creative task to design packaging for a new breakfast cereal. Interviews were conducted for children who were unable to attend a group session and therefore the individual interviews did not engage with the cereal task designed for groups. The interviews and focus groups were held at the Early Start Discovery Space at the University of Wollongong – a child-focused research facility, considering the importance of the right interview environment to make children feel welcome (Gibson, 2007).

#### 3.4.2.2 Autodriving (method)

The systematic review revealed all but one of the studies had used food stimuli, cues or material selected by the researchers. The study that involved children in the stimuli choices had presented them with a selection of brands and asked

them which brands they had an interaction or connection with (Letona et al., 2014). As the original stimuli selection was determined by the researchers, the children did not have a true opportunity to contribute meaningfully to the research stimuli.

This highlights a missed opportunity to probe further into children's responses and attitudes to food marketing because research has not explored the actual brands and products with which children had formed real relationships. As children are at the centre of these policy discussions, research was required to listen to children's own experiences and understand their role as consumers in the real world marketing landscape.

In Studies One and Two, children were asked to identify their favourite branded products so the studies could examine the brands and products most relevant in the current food environment, using research materials with which the children had a true connection. Previous studies have been criticised for requiring participants to make decisions involving only one or two brands, failing to adequately capture the complexity of the real world (Coates, 2006), therefore children in this study were asked to provide five stimuli. Children provided their favourite branded food and drink products in the form of photographs, obtained using strategies from a visual sociology technique, known as 'autodriving'. Autodriving is a photo-interviewing technique where, in place of being given photographs to comment on, photographs are taken by the interviewees themselves, indicating the interview is 'driven' by the photographer (Heisley and Levy, 1991). This technique can convey meaning and may generate new

understandings through deeper insight obtained through discussions (Close, 2007). Whilst the interview aspect of participant-developed stimuli is most relevant for Study One, these images were very important for forming the visual stimuli used in Study Two. Both studies were conducted during the same visit, as they used the same photographs from the same participants. This meant participants and their families were not inconvenienced by making two reasonably short visits to the university.

The photographs were obtained from participants prior to coming in for the studies. Participants took the photographs using a camera or a smartphone over a period of one week. They were supplied with a piloted photography guide (Appendix D) to the photograph requirements (e.g. ensuring the brand name was shown on the packaging) and instructions on how to send the photographs to the researcher. For use exclusively in Study Two, participants also provided five images of their close family and friends, following a second photography guide (Appendix E).

#### 3.4.2.3 Physiological method

Brand-consumer relationships, made on an emotional level (Roberts, 2005), have been inferred through methodology designed to measure explicit cognitive processing in response to unhealthy food brands and marketing techniques (King and Meiselman, 2010, McGale et al., 2016). This idea of an emotional connection reflects both the attachment and implicit-self theories that infer the powerful psychological nature of these relationships. Given at least some children's responses to brands are non-conscious and very difficult to retrieve

consciously (Ekman, 1992), the need for objective measures outweighs subjective measures. Subjective techniques are prone to social desirability bias, demand characteristics and peer influence. Methods that bypass conscious thought to measure implicit responses are not susceptible to these factors and provide a 'truer' response.

It is possible to gain an implicit emotional response to food brands through the measurement of physiological and psychological changes such as autonomic and endocrine responses (Ekman, 1992, Kringelbach, 2004). For that reason, this aspect of the research, an exploratory experiment, aimed to incorporate a physiological measure not used before in this field to determine whether an implicit emotional relationship with brands could be identified. The chosen physiological test, electrodermal activity (EDA), measures the variation of the electrical properties of skin in response to sweat secretion (Braithwaite et al., 2015). Eccrine glands are involved in emotion-evoked sweating (Poels and Dewitte, 2006). Increased sweat gland activity has been documented as a response to a pleasant appetitive stimulus (Bradley et al., 2001). Therefore, measurement of EDA was suitable for capturing an emotional response to branded food products. The physical apparatus involved in the measurement of EDA is also minimally invasive. It is easy to apply to and comfortable for child participants, and also easy to change between participants.

In this research, Study Two used a commercially-available, research-grade device (Simple Scope 2000, UFI, CA) to determine children's implicit responses to branded food, by measuring children's electrodermal activity to

visual cues. These cues included the five branded food images retrieved from the autodriving task using a photography guide (Appendix D) and five images of the participant's close family and friends, obtained using a photography guide (Appendix E).

## 3.5 Contemporary marketing techniques

### 3.5.1 Research gap

Food marketing thrives in a digitalised environment. It has metamorphosed into a range of persuasive techniques, whereby digital technologies have paved new routes to access child consumers (Calvert, 2008, Kelly et al., 2015b). Contextual evidence describing children's surroundings indicates children are inhabitants of a media-saturated environment (Signal et al., 2017, Wartella et al., 2016). The backdrop of screens and digitalised marketing platforms provide food manufacturers with an opportune context for facilitating pervasive omnichannel marketing campaigns. Brands have adopted such marketing vehicles, aiming to gain new customers and heighten brand exposure (Brynjolfsson et al., 2013).

The majority of published data on food marketing impacts has focused on traditional media such as television advertising or point-of-sale techniques such as persuasive packaging and labelling of unhealthy products. The need has been identified for more contemporaneous studies, including explorations of digitalised marketing, the influence of social media (Pettigrew et al., 2013) and advergames (Folkvord et al., 2013b). Research in this realm, particularly when paired with data on how children spend their time, has aided the progression of

a strong case for a reduction in children's exposure to digital marketing (Obesity Policy Coalition and The Global Obesity Centre, 2017, Tatlow-Golden, 2016). The WHO and the European Commission recognise the significance of digital marketing and have taken measures to protect children via an expert meeting in held in June 2018 (World Health Organization: Regional Office for Europe, 2018). This meeting proposed the development of a monitoring tool to capture the marketing of detrimental consumption products, which includes the digital marketing of foods high in saturated fat, sugar or salt (World Health Organization: Regional Office for Europe, 2018).

Despite some efforts by researchers to emulate contemporary digital marketing techniques to assess the impact these have on children (Folkvord et al., 2013b, Norman et al., 2018, Pettigrew et al., 2013), the techniques used remain comparatively underdeveloped when compared to the ever-expanding catalogue of techniques used by the industry to promote unhealthy foods. For example, research into advergames has typically manipulated the presence or absence of a food brand (Harris et al., 2012), or has concentrated on exploring mediating factors (Folkvord et al., 2017). The findings of these studies are hugely important. Yet the body of evidence lacks data on other persuasive advertising techniques used and alternative sophisticated game designs commonly used to deliver food marketing messages. In reality, children spend over 15 hours a week online (Ofcom, 2018), playing numerous games, which do not constitute only advergames developed by food manufacturers, but also games food manufacturers target with paid advertisements (An et al., 2014). The intricacies of the latter games, and their corresponding advertising techniques and game

designs are under-researched from a critical marketing perspective. In other words, acknowledgement of the influence of brand presence now requires research into 'how' these brand exposures are delivered in a gaming context. For strong policy to be developed to ensure the food industry cannot access regulatory loopholes (World Health Organization, 2018a) identification of prominent modern marketing and advertising techniques is crucial.

The systematic review highlighted expansion of the literature through exploration of a broader range of marketing techniques of a contemporaneous nature. Content analyses of digital marketing techniques can be informative sources of inspiration and rationalisation for further research in terms of replicating and measuring innovative contemporary techniques. For example, a recent content analysis of children's apps revealed the many advertising techniques used within online games, such as pop-up advertisements and advertisements viewed to unlock content in the game (Meyer et al., 2018). Whilst the current body of evidence has a strong focus on examining exposure to advergames, marketing techniques such as these have not been explored and therefore further assessment of marketing within online games was required.

### 3.5.2 Implementation

Whilst Studies One and Two focussed on the implementation of innovative methodologies, Study Three aimed to adopt contemporary marketing techniques as exposure variables to learn more about how modern advertising strategies and promotion vehicles of unhealthy food marketing effect children.

Study Three, a randomised controlled trial, used an online game as a vehicle of

food promotion exposure to explore the impact of different advertising techniques commonly paired with games played by children. It incorporated banner advertising, an advergame and rewarded video advertising to promote an unfamiliar confectionary brand. These techniques are commonly used, yet peripheral advertising and contextual advertising have been involved in little empirical research to measure their impact. Further detail on the methods used are provided in Chapter Six.

## 3.6 Ethical considerations

These research studies raised some ethical considerations including informed consent, exposure to unhealthy food marketing, child-specific considerations, confidentiality, anonymity, and obtaining ethical approval.

### 3.6.1 Ethical approval

Ethical approval for Studies One and Two was obtained in a combined submission from the University of Wollongong Human Research Ethics Committee (HE16-233) (Appendix A). Study Three obtained ethical approval from the University of Wollongong Human Research Ethics Committee (HE17-311) (Appendix I) and was prospectively registered with the Australian and New Zealand Clinical Trials Registry (ACTRN12617001313325) (Appendix J).

### 3.6.2 Child-specific considerations

#### 3.6.2.1 Informed consent process

Recruiting children aged between 7-12 years entailed the need to obtain parental written consent and to promote the studies specifically at the parents and

guardians of potential participants. Promotion of Studies One and Two occurred through graphical posters across the University of Wollongong, in local school newsletters and via Facebook advertisements using Facebook Ads Manager. Study Three took the same approach, with the addition of an email sent to subscribers of the University of Wollongong Sports Camp mailing list and an information blurb for parents and guardians displayed at Peak Sports and Learning afterschool centres. This was because The University of Wollongong Sports Camp and Peak Sports and Learning Parents (local afterschool care franchise) had both agreed to collaborate with the study to assist recruitment (Appendix K and Appendix L).

Interested parents and guardians made contact with the lead researcher using the supplied contact details and subsequently provided with a Parent Information Letter (Appendix B) (Studies One and Two) and (Appendix M and Appendix N) (Study Three). This letter contained all the relevant study information to allow an informed decision regarding if they wanted their child to participate. It also included contact details of the lead researcher and supervisors if parents or guardians wished to ask any questions. In case of any concerns regarding the research procedure, information for contacting the University of Wollongong Human Research Ethics Committee was also included.

Informed written consent (Appendix C) (Study One and Two) and (Appendix O and Appendix P) (Study Three) was obtained from all parents and guardians of participants. All participants provided verbal assent at the time of participation (Appendix F). Participants were reminded at the time of the study, as was

detailed in the Parent Information Letters and Consent Forms that participation was voluntary and participants could withdraw at any time without providing a reason. Parents and guardians could withdraw their child's data up until the point of de-identification. Withdrawn data would then be erased.

#### 3.6.2.2 Safeguarding children

The researcher and all research assistants working with the children had a current NSW Working with Children Check (WWCC) and children were supervised at all times.

### 3.6.3 Study-specific considerations

#### 3.6.3.1 Anthropometric measures

Participants' height and weight were measured at the end of participation in Study Three. Participants were not coerced to do so, and these measurements were undertaken in private by trained staff using standard procedure (with clothes and no shoes). Neither the child nor any subsequent children saw the measurements recorded.

#### 3.6.3.2 Food allergies and intolerances

Study Three involved a consumption measurement and so any child who had food allergies, food intolerances, a dislike to or medical conditions related to the foods provided were excluded.

#### 3.6.3.3. Exposure to unhealthy food marketing

The research aims required the studies to involve unhealthy food cues and/or

marketing as stimuli. Children are ordinarily exposed to large quantities of unhealthy food marketing in real life (Signal et al., 2017) and the exposure presented in the studies would not have significantly added to this. Studies One and Two used branded products provided by the participants themselves and these were not marketed to the children - they were simply presented as the photographs they originally submitted. Study Three only exposed 75% of the children to marketing because the control condition did not involve any product marketing. Children in the experimental conditions were only exposed to food marketing for the four-minute game duration, and the advertised brand was an overseas brand, therefore not available for purchase in supermarkets in Australia. For these reasons it was anticipated the children would not experience any lasting detrimental effects from the marketing exposure in the study.

### 3.6.4 Confidentiality and anonymity

Each participant was given a unique identification number to ensure all information and data obtained were kept anonymous. All questionnaires and data collected were de-identified and coded for the purpose of data analyses. Hard copy data files are kept in a locked filing cabinet in the PhD candidate's office in Room 214, Building 21 at the University of Wollongong. Electronic files are kept in password-protected folders on the PhD candidate's computer hard drive and backed up to the secure university server in a password protected file. Access to data is restricted to researchers listed on the ethics application.

## 3.7 Chapter summary

This chapter outlined details of the methodological approach taken to conduct each of the three research studies. This included a combination of quantitative and qualitative tools – semi-structured interviews, physiological measures and a randomised controlled trial. Ethical issues including parental informed consent, confidentiality and anonymity, and voluntary participation were taken into account when conducting this research. The next chapter will present Study One, which sought to investigate the explicit associations and attitudes children have with branded food products. It details the use of child-centered qualitative methodology involving two child-centered activities, and the inclusion of participant-developed stimuli.

# 4.0 CHAPTER FOUR - STUDY ONE

## 4.1 Preface

A review of the available literature (Chapter Two) identified 3 out of 71 studies used qualitative methodology to explore the impact of food marketing on children's attitudes, preferences or consumption. This highlighted a distinct need for research that involved children in a more meaningfully way, to provide further insight into how marketing influences them. This review indicated the brands used as stimuli in previous research (in both quantitative and qualitative studies) had always been selected as potentially appealing by the researchers, apart from one study which involved a joint decision between children and the researchers. Notably, stimuli nominated by children themselves as the most personally appealing had never been used, which is critical to inform the real-life implications of food marketing. Therefore this study (as detailed in Chapter Three) used participant-developed stimuli.

This chapter explores the first research question: What are the explicit associations and attitudes children have to branded food products, including to their own favourite products and a hypothetical product?

This chapter details the findings of Study One which were drafted into a manuscript for submission at the *Australian and New Zealand Journal of Public Health*. It is presented as it was submitted with minor alterations in terms of formatting (such as table and figure numbering, spelling and the referencing

style) to maintain cohesion within the thesis and to conform to the University of Wollongong's referencing style which is Harvard.

**Citation:** Smith R., Kelly, B., Yeatman, H., Baur, L., King, L., Boyland, E., Thomas, S., Chapman, K., Hughes, C., & Bauman, A. "Be like John Cena and eat this today." Children are highly engaged with the marketing techniques used to promote branded food and drinks. *Australian and New Zealand Journal of Public Health* (under review).

**Author's contribution:** BK was the Chief Investigator of the study and led the writing of the initial study protocol and successful funding application. All authors contributed to the conception and design of the study. BK and HY supervised **RS**. **RS** primarily implemented the study protocol, including recruitment. **RS** led the analysis, in collaboration with the broader research group. **RS** drafted the manuscript. All authors contributed to critical revision of this manuscript and have approved the final version.

## 4.2 Manuscript - "Be like John Cena and eat this today" Children are highly engaged with the marketing techniques used to promote unhealthy foods.

### 4.2.1 Abstract

Objective: To explore the appeal of persuasive food marketing techniques from a child's perspective.

Methods: Child-centered qualitative methodology and semi-structured interviews were employed with groups and individuals. Participants provided photographs of their favourite branded food products for discussion and in a group activity participants were tasked with marketing a hypothetical food product. Interviews were recorded, transcribed verbatim and coded. Data were analysed using descriptive thematic analysis.

Results: Children aged 8-11 years (N=52) were recruited via opportunity sampling in New South Wales, Australia. The marketing techniques used to promote food products that children consider most appealing were identified. The main themes that emerged were use of characters, place of exposure, fun, self-identity and branded jargon.

Conclusions: The use of participant-developed discussion stimuli provided new insights into what constitutes children's favourite food brands. Results highlight the potential for these marketing techniques to influence food preferences of child consumers and confirmed the psychological power of everyday marketing exposures.

Implications for Public Health: Reducing children's exposure to, and the power of unhealthy food marketing is recognised as a global health priority for obesity prevention. These findings serve as a guide to identifying techniques as foci of regulation to food marketing.

### 4.2.2 Introduction

In Australia, one-quarter of children aged 5-12 years are overweight or obese (Australian Institute of Health and Welfare, 2015). Poor nutrition in childhood can influence both immediate and lifelong negative health outcomes (Simmonds et al., 2015) including the early development of diabetes (Sahoo et al., 2015) and dental caries (Anil and Anand, 2017). Whilst the aetiology of overweight and obesity involves a complex mix of antecedents (Leung, 2014), research points to the 'obesogenic' or an obesity-promoting environment playing a central role in negatively influencing diet-related outcomes (Swinburn and Egger, 2002, Swinburn et al., 2011). This environment includes the marketing of unhealthy foods, which is known to influence behavioural outcomes including food preferences, purchase requests and consumption patterns (World Health Organization, 2012). This has been recognised as a prioritized global health challenge (World Health Organization, 2010) and has provoked calls for significant changes in food marketing practices to children (Cancer Council New South Wales, 2016, Cerny C., 2017, Obesity Policy Coalition and The Global Obesity Centre, 2017). In particular, the World Health Organization has acknowledged the importance of determining not only the impact of quantified exposure to food marketing but also the persuasive power of marketing's

design, creative content and execution (World Health Organization, 2012).

The ‘branding’ of a product, the identifiable name or image of a brand differentiating it from competitors (Bennett and Cooper, 1984), is important for connecting with the target consumers and enabling market success (Park, 2010). Multinational food and beverage companies invest substantial resources into building their brands, and their marketing budgets dwarf government spending on promoting good nutrition (O’Dowd, 2017). The development of meaningful connections with consumers is advantageous for the brand when instigated at a young age (Mininni, 2005), as the establishment of early relationships with consumers provides brands with the prospect of lifetime loyalty and associated purchases. Brand awareness in childhood is linked to more fluent recognition of brands (Ellis et al., 2010) and early advertising exposure leads to biased product evaluations that persist into adulthood (Connell et al., 2014). The significance of brand awareness and attitudes has been documented as the first link in a chain within the Hierarchy of Effects model, a matrix that provides a conceptual pathway of the effects of unhealthy food promotions (Kelly et al., 2015a). The model indicates that brand awareness and attitudes are critical precedents to product purchase intent, and therefore are likely to influence negative post-consumption effects (Kelly et al., 2015a).

The cognitive immaturity of young consumers may expedite evolving relationships with brands due to difficulty with understanding marketing for its core purpose: to persuade and influence choice behaviour (Smits et al., 2015). It has been suggested that children do not gain a critical understanding until 11 to

16 years of age (Roedder-John, 1999), and so younger children will frequently interpret commercial messages as factual (Wilcox, 2004). This vulnerability is exacerbated by use of marketing techniques that subvert conscious awareness and typically take an emotional approach in appealing to consumers, such that brand associations are developed at a subconscious level (Jenkin et al., 2014). Branding can fulfil symbolic and hedonic needs (MacInnis, 2012) by providing tools for consumers to express themselves through brands they can incorporate into their personality (Cătălin and Andreea, 2014). This use of brands can occur as children develop self-concepts, and participate in self-appraisals of whom they view themselves to be and think about themselves in abstract ways (Baumeister, 1999, Chaplin, 2005). Such self-brand connections mature when the brands are perceived to be most compatible with the individual's personality (Chaplin, 2005). In the period between 7-13 years of age, emotional connections with brands have been found to increase in number and depth (Chaplin, 2005) and become the foundations of maintaining a long-term brand relationship (Keller, 2003).

Companies that manufacture unhealthy food brands commonly use persuasive marketing techniques to promote these brands, that include use of humour, promotional characters and celebrity endorsements (Boyland et al., 2012). These marketing techniques rely largely on psychological mechanisms for their effectiveness and can operate on multiple levels. For example, use of promotional characters and celebrity endorsements establish the presence of a role model to prompt behaviour in children that mirrors the behaviour of the role model (Bandura, 1977, Boyland et al., 2013, Harris, 1972, Kraak, 2015,

Roberto et al., 2010). Brands also use these marketing techniques to become personally appealing to the consumer, by using characters as visual cues of the brand's personality (Garretson and Burton, 2005). Consequently, child consumers may purchase a product believing it to be a gateway to create similarities or develop relationships between themselves and the promotional character or celebrity.

The current literature on food marketing to children highlights the penetrative nature and scale of marketing campaigns for unhealthy food, particularly on television (Cairns et al., 2013). Many of these studies have quantified food marketing exposure (Mehta et al., 2012, Signal et al., 2017) or examined the effect of exposure within laboratory settings (Boyland, 2016, Folkvord et al., 2013b). There is less research that has explored the child-brand consumer dynamic through a child's perspective, using a qualitative and child-centered methodology, though the studies available have provided deep and insightful responses (Elliott, 2009). To our knowledge, previous studies have consistently used materials selected by the researchers as potentially appealing. Therefore, it was concluded that no studies that have yet conducted qualitative or quantitative research into the influence of food marketing on children's attitudes and preferences using the participant's personal favourite brands as discussion stimuli. Research that explores the influence of marketing techniques through a child's perspective using their favourite food brands could provide further insight into the real-life implications of accumulative and long-term exposures to marketing.

The aim of this study was to explore how child consumers interact with food brands in the current food marketing context using descriptive thematic analysis (Clarke and Braun, 2013). In particular, it aimed to gain a rich understanding of what children respond to by using their self-appointed favourite brands as discussion stimuli. In doing so, the study intended to provide further evidence to inform policy actions on food marketing to protect children from particularly appealing techniques and media.

The study was guided by two research questions:

1. Which marketing techniques resonate most strongly with children in the promotion of food products?
2. What associations and interactions do children make with their most preferred food brands?

### 4.2.3 Methods

Ethical approval for this study was obtained from the University of Wollongong Human Research Ethics Committee (HE16-233) (Appendix A). Informed written consent was obtained from parents and guardians (Appendix C), including verbal assent from the children at the time of participation (Appendix F).

#### *4.2.3.1 Sampling and recruitment*

Participants were recruited via opportunistic sampling that targeted parents in the Illawarra region of NSW, Australia. The study was promoted via flyers around the University of Wollongong campus and in school newsletters.

Facebook advertisements targeted parents of potential participants using the Facebook Adverts Manager and were shared in Facebook groups liked by parents in the local area (i.e. a community noticeboard). Snowball sampling was also utilised as parents were asked at the end of the study if they could recommend the study to other parents. Interested parents contacted the researcher to acquire further participant information and a parental consent form.

Only children with written parental consent partook in the study (Appendix C) and verbal assent was provided by the children before participation (Appendix F). The study was conducted at the Early Start Research Institute at the University of Wollongong – a custom-built child-focused research facility with informal, child-friendly décor in the rooms, which created a relaxed environment for interviews. Parents and individuals accompanying the participants were provided with a drink at an on-site café whilst waiting for their child. Basic demographic information was collected from each participant prior to the interview commencing. This included participant age, gender and family postcode. Postcodes were recorded to determine a family's Socio-Economic Indexes for Areas (SEIFA) index. If the child was unsure of any information, any missing details were clarified by a parent after the study had finished. Information on families who chose not to participate after establishing contact was not collected.

#### *4.2.3.2 Design*

This study used semi-structured interviews that involved two activities: activity one (cereal design) and activity two (favourite branded photographs), which are

detailed below in Figure 4.2. Participants were only interviewed once and due to logistical constraints, children participated in the study either in a small group of three (based on friendship groups or availability) or individually. All interviews were audio-recorded with written parental consent (Appendix C) and the children's verbal assent (Appendix F).

The first author and the qualitative researcher were both females with relevant qualifications (BSc(Hons) Psychology; BAppSc/BSc(Hons) Public Health Education & Promotion), with prior experience in leading qualitative interviews and working with children. The interviews with individuals were exclusively facilitated by the first author and the interviews with groups were facilitated by both researchers (and led by the qualitative researcher). At the beginning of each interview, the facilitators introduced themselves, thanked the children for attending and informed them that they were interested in what the children thought about different brands. Children's understanding of the term brand was confirmed by asking them to name as many brands of running shoes that they could. A set of semi-structured interview prompts were used to ensure all children undertaking the same activities were asked similar questions (Appendix G). The structure of the study including the photography guides (Appendix D and Appendix E) and the prompts used (Appendix G) were pilot tested by the lead author with six children (not included in the final analysis), which indicated phrasing that was effective and/or confusing for children. The lead author also made field notes to allow for reflection and to inform each subsequent interview. The interview began once the children seemed comfortable and had introduced themselves by telling the facilitator what they

had for breakfast as an ice-breaker.

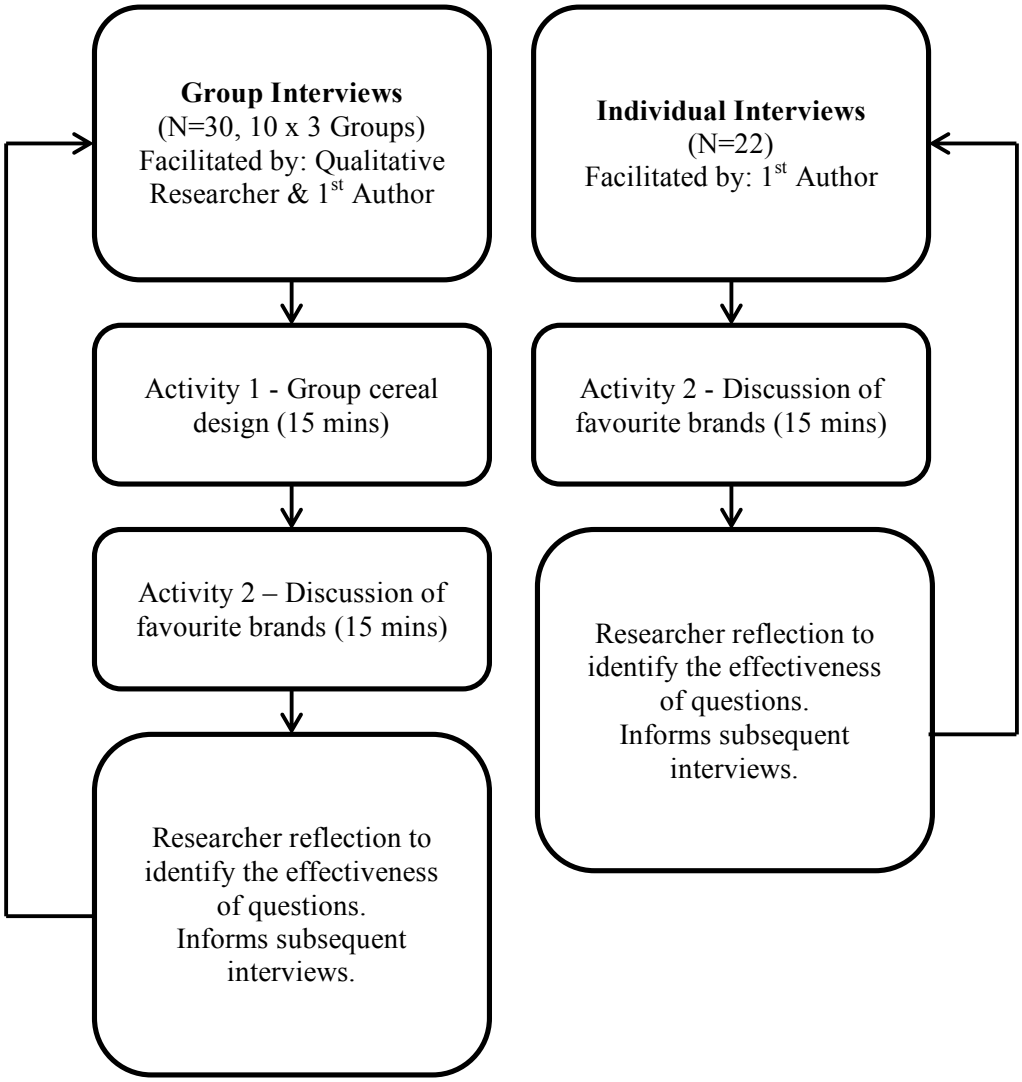


**Figure 4.2 Study design flowchart**

*4.2.3.2.1 Activity one – group cereal design*

To explore which marketing techniques resonated most with children, the participants in groups of three were given a marketing task. The children who participated individually were not asked to complete this activity as it was designed to be a group activity so that there was no pressure on one child to create something. Children were presented with a blank cereal box made of A3

paper (Appendix H) and were asked to design a box of cereal they believed children their own age would want to buy. Asking for the perspective of others, rather than asking the children to speak personally, is thought to facilitate the projection of individuals unconscious attitudes (Holmes, 1968) and known to reduce social desirability amongst interviewees (Fisher, 1993). Throughout the task the facilitator generated discussions using prompts (Appendix G) such as "what will the name be?" and "how will children know it's made for them?" as the groups made decisions. The design choices were unique to each group, but often included the name, colours, product type, slogans, and how they would advertise the product.

*4.2.3.2.2 Activity two- favourite branded products*

As a means to explore children's associations and interactions with their favourite products, it was critical to ensure the discussion stimuli featured brands with which the participants genuinely had connections. Therefore, stimuli were obtained using strategies from a visual sociology technique, known as 'autodriving'. Autodriving is a photo-interviewing technique where in place of being given photographs to comment on, the photographs are taken by the interviewees themselves, indicating that the interview is 'driven' by the photographer (Heisley and Levy, 1991). This technique can convey meaning and may generate new understandings through deeper insight obtained through discussions (Close, 2007). The benefits of utilising this technique to capture children's favourite brands included: gaining a richer context of brand exposure (e.g. place, time) compared with asking for a simple list; more time to contemplate their favourite brands rather than the pressure of being asked on the

spot; and finally, the photography aimed to add an element of fun to the participation process to facilitate engagement.

To obtain these photographs, before coming in for the study all participants were asked to provide five photographs (with the help of their parents) using a camera or a smartphone of their favourite branded foods or beverages. They were given a week to take the photographs and a photography guide to advise on photograph requirements (e.g. ensuring the brand name was shown on the packaging) (Appendix D) which included instructions on how to send the photographs to the first author. During the interviews, participants independently ranked the photographs of their favourite branded products from their most favourite photograph to their least favourite. The term 'photograph' rather than 'product or brand' was purposely used to reduce pressure to order the photographs in a socially desirable way, i.e. thinking that the facilitator might prefer to see the healthiest brands at the top. Children in the group interviews may have watched each other order the photographs, however, they were preoccupied with ordering their own photos and each child had a unique set of photographs, making it unlikely that the peers' presence would have a strong influence on their orders.

The activity facilitator conducted semi-structured interviews about the favourite photographs and asked about each child's chosen order. Participants identified personal associations and interactions including how they first heard of the brands, what they liked most about the brands and described the occasions when they consumed the products. In group interviews, these enquiries were made by

addressing questions to the individual and then opening it up to the group, to understand individual interactions with personal favourite brands, and to understand the group's reactions and attitudes towards each other's favourite brands. The facilitator ensured each group member was given equal opportunity to share their thoughts by reminding the participants to show mutual respect and listen to each other. Moreover, the influence of the preceding cereal task discussion on the opinions participants in a group expressed was limited by the facilitator asking the children to describe their interactions with the product, rather than simply what they just liked about the packaging.

*4.2.3.4 Data analysis*

All interviews conducted were recorded, transcribed verbatim and analysed in Microsoft Word by the first, second and third authors, using descriptive thematic analysis (Clarke and Braun, 2013). All participants data were de-identified, although confidentiality and anonymity could not always be ensured due to the group nature of activity one. Analysis began from the first interview and ran concurrently with data collection; data saturation was determined when no new themes emerged from the transcripts. The transcripts were separated into the two activities and analysed independently. In each activity, the first author identified 'codes' that stood out as meaningful to the children across the transcripts. These codes were edited to reflect a collaborative interpretation of the codes using the second and third authors' evaluations of the transcripts to increase the credibility of the research process (Given, 2008). The chosen codes were reviewed for potential compatibility with other codes and categorised into themes that expressed the key message behind individual codes or multiple

codes grouped together. Peer debriefing was used to enhance the credibility of the results, where the preliminary themes were presented to the second and third authors as they were developed to ensure they reflected the data accurately (Patton, 1990). Through familiarisation with the potential themes, it became apparent that both activities presented many overlapping themes and so they were grouped together. The final decision on the themes was the result of a joint collaboration from the broader research group that reflected the children's ideas and their speech.

### 4.2.4 Results

#### *4.2.4.1 Participant information*

Data were collected between September 2016 and July 2017. Fifty-two children aged 8-11 years participated in the study: thirty children took part in the group interviews (19 male, 11 female) and 22 children participated in the individual interviews (14 male, 8 female). Recorded postcodes were used to determine the socio-economic status of the participant cohort. The SEIFA Index of Disadvantage for Wollongong and Shellharbour (Australian Bureau of Statistics, 2016) indicated a spread of socio-economic status (27% low, 63% middle, 0% high) that would be considered to be similar, if not slightly less disadvantaged than the average population in the recruitment locale (Australian Bureau of Statistics, 2016). Whilst not a key outcome, it was interesting to note the overall composition of the brands provided. All participants provided five photographs of their favourite brands, and out of the 260 images, 78% were classified as discretionary using the Australian Health Survey Discretionary Food List (Australian Bureau of Statistics, 2014b). These brands can be found in

Appendix W. Participant quotations are referred to by an assigned group letter (individuals were also assigned a letter). Letters were paired with a number to indicate different speakers i.e. 'A1'and 'A2'. For the purpose of this manuscript, the goal was not to quantify the interview findings, but to provide a nuanced account of children's attitudes and perspectives.

The main themes that arose from the children's responses consisted of *use of characters, place of exposure, fun, self-identity* and *branded jargon.* They provide meaningful insights to answer the study's research questions. Generally, the identification of marketing techniques which resonated most strongly with children in the promotion of food products were addressed in *use of characters, place of exposure,* and *fun*. The associations and interactions that children made with their most preferred food brands are largely answered in *use of characters, place of exposure, fun,* and *self-identity.* Another theme that arose from the data, which reflected the associations and interactions that children had with branded food products more generally was the use of *branded jargon*.

*4.2.4.2 Use of characters*

The use of characters (an encompassing theme that includes fictitious and real people) was considered important in both the design of the packaging and the proposed branding of the child-designed cereal. For several children, their favourite aspect of their chosen brands was the presence of anthropomorphic animals and humanised products (e.g. the product with arms and legs) in the advertisements because they found them funny and they claimed to like the images on the packaging. Most of the groups in the cereal task also identified

the need for a character on the packaging or for a familiar character to endorse it for it to appeal to children their age. The types of characters mentioned included two sub-themes: characters created for the product and familiar characters/identities.

*4.2.4.2.1 Characters created for the product*

In the cereal design task, six out of ten groups wanted a character on the packaging, nearly all of whom created their own character, which was often an animal or a cartoon human character.

*"Let's call it a funky monkey." [10 yo girl, A3]*

*"And then it could be about monkeys, they look like little monkeys." [9 yo girl, A2]*

A character created specifically for the product was also one of the most alluring aspects of food and beverage products that the children identified as their favourites.

*"It was the monkey on the front cover."[8 yo boy, H1]*

*"It has a little girl that's like a princess on it… Some littles girl says 'Mum, I'm not eating that. It's disgusting'. And then they see the packaging and be like, 'oh, I'm going to turn into a princess!'"[11 yo girl, K1]*

Participants implied that a character can influence children's perceptions of a product, as per the previous example where an enticing character (a princess), might increase the desirability of a product if the child believes that consuming the product will create similarities between themselves and the character.

*4.2.4.2.2 Familiar characters/identities*

Children expressed preferences for branding that incorporated the identity of, or made reference to, fictional and real mainstream figures (celebrities). These fictional or celebrities identified were typical of pop-culture references. For example, one group described why they included the fictional character Harry Potter on the front of the packaging for their cereal.

*"People are attracted to it"[11 yo boy, B1]*

*"Kids would find him cool and just want to be like him and think it's what he eats." [9 yo boy, B2]*

A child in the same group also suggested promoting the cereal with an endorsement from a celebrity wrestler. This reinforces the concept of children wanting to be like the characters and that they view the purchase or consumption of a product as a way to establish a similarity.

*"Be like John Cena and eat this today."[8 yo boy, B3]*

A group also suggested that the product should be promoted using PewDiePie, a YouTube vlogger (video blogger) who has the 4$^{th}$ highest subscribed YouTube channel in the world (with nearly 65 million subscribers) (Social Blade, 2018). This provides an example of the types of figures that engage and influence children of this age.

*4.2.4.3 Place of exposure*

Children explained that they were usually exposed to, or became aware of, their

favourite brands by discussing these with their friends, through product placement in movies, and from advertisements on television. The cereal task indicated many other locations and media platforms that the participants believed most effectively marketed to children. This included internet advertisements, promotions in the supermarket and sponsorships.

YouTube was the first recommendation as a suitable media platform by two different all-male focus groups.

*Facilitator "So who do you think is going to want to buy this?"*

*"Men. Maybe like YouTubers that do gaming or something, they could like promote it ... like PewDiePie or something." [11 yo boy, G1]*

*"Sponsoring."[11 yo boy, G2]*

*"Like we would like ask them to do like a sponsor video or like they would just free willingly just go out and buy the product and like show it in one of their videos"[11 yo boy, G1]*

*"It would be like 'in today's vlog, we're going to be go buying some gamers' breakfast because that's what I need'."[11 yo boy, G3]*

This highlights that the places marketers promote their products to children are extensive and include promotion on digital media. The quotations above also indicate these children were aware of sponsored advertising and this type of 'influencer' marketing was normalised in their world. An 'influencer' is defined as an Internet personality, usually with a personal channel and a high subscriber base, whose opinions and recommendations influence their subscribers (Tatlow-Golden, 2016).

*4.2.4.4 Fun*

A brand or product that channelled 'fun' was important and manifested mainly

in humour and novelty. Humour was chiefly a key characteristic of the children's favourite branded products. In particular, children noted use of humour to promote brands in the behaviour of the promotional characters and in television advertisements.

*"M&Ms…it has humour in them fighting each other" [10 yo boy, D1]*

*"The ads are funny."[10 yo boy, D2]*

The novelty aspect of the product, particularly in the cereal design task, highlighted the importance of creating a fun brand experience. The groups appeared to be most engaged with and excited by the cereal task when choosing the unique features of the product. They particularly enjoyed creating a sense of mystery or danger and eight out of the ten groups believed that this novelty element should be represented by a unique cereal flavour.

*"I'm thinking of these wheat balls and then it has like - inside it, there's like banana flavour or strawberry flavour inside it."[10 yo girl, E1]*

*"It could be poison flavour – warning, you take high risk if you try me" [11 yo boy, B1]*

*"Write "try and guess the mystery flavour"" [10 yo girl, A1]*

The liking of a novelty feature also emerged when the children were describing their most preferred branded food and beverages because they liked the entertaining aspects of the product in addition to the taste.

*"That's slime, it's edible. It kind of like sticks on your hand and you lick it off and you get lots of different flavours"[9 yo girl, J1]*

The importance of novelty may have reflected the stage of emotional development of the participants, suggesting that fun and enjoyment with a product was considered a high priority, and important for engaging children this age.

*4.2.4.5 Self-identity*

Across both tasks, children disclosed that effective branding incorporates their interests and complements their personality. To illustrate this, children suggested that particular hobbies and colours should appear as images on the cereal packaging. They also believed that any children depicted on the packaging needed a similar appearance to the children that the cereal was targeting.

*"The girls probably won't like it, … a little bit of boyish drawings."[8 yo boy, H2]*

*Facilitator "… what are the right things that should be on a cereal box for girls?"*

*"Princesses, girl chefs. I don't know"[8 yo boy H3]*

*"Stuff like Shopkins"[8 yo boy, H1]*

*"There's going to be a face there, eating it…It's going to be a child…because everyone likes children…and everyone likes a happy child…because they're children as well" [10 yo boy, D1]*

The children's views suggested they would typically generalise and stereotype what it meant to be a male or female. A potential 'in and out' group mentality was a desire for child-orientated branding that did not include any cues to adult identities.

The notion of compatibility with children's life also extended to pairing branded products with physical activity references. Many children, especially males, valued branding within their favourite products, particularly cereals that presented an athletic affiliation and projected the impression that the product could complement their own sport hobbies.

*Facilitator "Who do you think they make this for - the Milo? Describe that kind of person."*

*"People who want to go outside and play…it shows you on the side - right there…of someone playing, like footy, or something" [9 yo boy, L1]*

*"Because I like playing sport it looks like all these people use it, maybe I could use it so I could get up and ready for playing sport or something." [9 yo boy, E1]*

*"Everyone who likes cricket. I think the Big Bash was on and lots of people watch the Big Bash, so they said 'Ooh look, it's the big bash, we should get some big bash stuff to eat', so they got it." [10 yo boy, D1]*
(Big Bash = Australian cricket league)

One of the most frequently provided brands, incorporated athletic figures as described above. This highlighted the appeal of products that incorporate a physical activity or hobby of the consumer. The children described the images on the packaging were informative of how to use the product i.e. to consume it before physical activity. Therefore, this suggests children draw parallels between what is displayed on the packaging and who the product is for.

Finally, an indication of separation anxiety was highlighted by children displaying hypothetical distress upon potential separation from their favourite

branded products. To measure whether the participants would convey a relationship with their favourite brands that indicated a strong attachment, children were asked how they would feel if they experienced an unexpected separation from their favourite branded products (if they stopped selling it in the shops). Their answers were indicative of an emotional response, particularly expressed through sadness and anger.

*"And then I got it so many times. And then I just loved it. It's my favourite chocolate…I would cry for hours."[8 yo girl, K2]*

The distressed responses suggested the children had grown attached to their favourite brands and considered them an important part of their self-identity.

*4.2.4.6 Branded jargon*

In the cereal task, the children's vocabulary was rich in branded jargon. The children seemed to frequently exchange ingredient names for branded products and discuss flavours in terms of a trading brand name.

*"What about we do Fruit Curls… they're like Froot Loops but they're in curls" [9 yo boy, B2]*

*"What flavour is orange?" [9 yo girl, A2]*

*"Um Fanta" [10 yo girl, A3]*

Children including brand names in their vocabulary with fluidity highlighted the normalisation of branded products and implied children may think in terms of brand names more than the products themselves (i.e. ingredients).

**4.2.5 Discussion**

Given that literature has previously reported on the prolific use of many marketing techniques (Boyland et al., 2012, Folta et al., 2006, Kelly et al., 2008c), and show they have a detrimental impact of children's behavioural outcomes including attitudes, preferences and consumption (Boyland, 2016, Obesity Policy Coalition and The Global Obesity Centre, 2017, World Health Organization, 2016), children's exposure to food marketing is an important issue for public health (World Health Organization, 2012). The current study explored the marketing techniques that resonated most strongly with children in the promotion of food products and how this can influence preferences for real and hypothetical brands. It also explored the interactions and associations children have with their most favourite branded products.

The findings suggest that the common persuasive techniques used to market food brands are very influential on children, and are familiar, internalised and emotionally appealing. Many of the themes that emerged have been recognised for their power in previous studies, such as characters created for the product and use of familiar characters (commonly referred to in the literature as brand equity characters and celebrity endorsements, licensed characters or influencer marketing) (Boyland et al., 2012, McGale et al., 2016, Tatlow-Golden, 2016). Brand equity characters, celebrity endorsements and licensed characters have all been found to influence the liking of brands (Institute of Medicine, 2006) taste preferences (Letona et al., 2014, Roberto et al., 2010), and lead children to eat significantly more in their presence (Boyland et al., 2013). In particular, the influence of licensed characters on preference has been documented in cereal preferences (Lapierre et al., 2011) and is most powerful when familiar media

characters are used (Kraak, 2015), which was what the children suggested they would like on their fictitious cereal. In addition, the current study also highlighted the powerful appeal of characters created for the product (brand equity characters) as the children were very enthused by this in the cereal activity. Children also indicated other children their age would be likely to respond to a vlogger (video blogger) promoting the cereal product. A recent UK report on children's media use and attitudes indicated vloggers (video bloggers) are an increasingly important source of inspiration and aspiration and 40% of children aged 8-11 years old, the same as the participant age group, watched vloggers online (Ofcom, 2018). There is currently no research published on the impacts of influencer marketing (use of influential Internet personalities) that promotes food to children and so this presents an area for future studies.

The current study also identified leading platforms of exposure and advertising. Some participants believed the best place to advertise a product would be via a vlog (video blog), where vloggers are housed on YouTube. YouTube has been documented as the most frequently-used content provider by 12-15 year-olds and usage by 8-11 year-olds has increased substantially with 49% per cent preferring to watch YouTube than television programs (Ofcom, 2018). Word-of-mouth advertising has become increasingly prevalent (Tatlow-Golden, 2016) as individuals trust their friend's recommendations more than advertising campaigns (Kozinets et al., 2010). Accordingly, brands aim to communicate through media that appear more personal and trustworthy, such as influencers and vloggers (Tatlow-Golden, 2016). Interestingly, the children in the current study indicated they were aware opinions expressed through vloggers were not

invariably subjective (as they can be paid to promote a product) yet the children did not express any issues of deceit. This suggests awareness of this marketing does not necessarily induce a critical or cynical defence to it.

Associations and interactions children make with their most preferred food brands were explored and revealed insights into the ways that children incorporate branded food products into many aspects of their lives. The findings suggest children draw similarities between the branded products and activities they partake in and rely on packaging cues to identify for whom the product is designed. In addition, most of the photographs of children's most favourite brands were categorised as discretionary products (Australian Bureau of Statistics, 2014b) and over half were brands owned by signatories to the Responsible Children's Marketing Initiative or Quick Service Restaurant Industry Company Action Plans. These brands have pledged not to market unhealthy foods to children under 12 years of age (Australian Food and Grocery Council, 2014a, Australian Food and Grocery Council, 2014b), however, children were revealed to be particularly favourable to these brands, indicating them as their favourites, suggesting the voluntary regulation has limitations.

*4.2.5.1 Strengths and limitations*

This study has a number of strengths. The implementation of child-centered methodology and semi-structured interviews facilitated research responsive to the voice of the child and contributed new perspectives. It also provided the opportunity to open a dialogue with children about their understandings of the roles of marketing in their food behaviours and choices. To our knowledge, this

is the first study to have explored the role of marketing on children's food associations and preferences from a public health perspective utilising participant developed stimuli to address genuine and existing brand-consumer dynamics. This allowed the study to examine the qualities of branded products children gravitated to and formed connections with in real life potentially developed from accumulative or long-term exposures to food marketing.

In addition, the inclusion of the cereal box activity facilitated creativity in packaging design, promotional techniques and free-reign on creating the edible product. Cereal was chosen as it was a commonly consumed product (Australian Bureau of Statistics, 2014a) and a major contributor of sugar to children's diets (Public Health England and The Food Standards Agency, 2016). Therefore, identification of the engaging components of cereal branding and marketing could assist in informing public health advocacy to improve children's diets by informing the foci of regulation (this could apply to all marketing techniques identified in this study). Moreover, these appealing aspects contain potential strategies to market healthy foods to children.

This study utilised various verification strategies to achieve reliability and validity, which in turn contributed to rigor. In particular, the study aimed to achieve methodological coherence by using appropriate methodology to address the research questions (Morse et al., 2002); using a sample whom best represented the research topic (Morse et al., 2002); collecting and analysing data concurrently (Morse et al., 2002) and analysing theoretically, ensuring new ideas were verified in the data (Morse et al., 2002).

A potential limitation of this study was a possible social desirability bias in the cultivation of the favourite brands provided by the participants. Participants submitted the photographs with the help of an adult and it was possible this influenced the favourite brands submitted. Participants or their families may have tried to provide a selection of brands that varied in healthiness, meaning the connection to some brands may not have been as strong as genuinely favoured brands. However, the participant information provided reminded parents their child would discuss their engagement and preference for their favourite brands and the study had a focus on brands and not nutrition. This information was included to deter them from selecting brands with which they did not have a favourable interaction.

Secondly, logistical constraints meant that children participated in the study either in a small group of three (based on friendship groups or availability) or individually. Whilst the tools and the processes remained the same, this may have affected the level of comfort that the children felt in discussions.

In addition, whilst this research implemented strategies to minimise potential bias, such as the independent analysis of the transcripts by the second and third authors (Smith and Noble, 2014), the permeation of researchers personal beliefs and experiences onto the findings could not be entirely avoided.

Finally, the opportunistic sampling resulted in a gender skew, which may have influenced the tone of the interviews or created a bias towards male attitudes

(that may have differed from female attitudes). However, attempts to recruit equal numbers of each gender were not considered necessary because differences between genders were not a focus of the study. Gender analysis of how children respond to marketing techniques using the same methodology could be considered as an area for future research.

### 4.2.6 Conclusions and Implications for Public Health

The current study aimed to bring a valuable contribution to the body of evidence that brings children's perspectives into conversations about policies that impacts them the most. Considering children are a central focus of the obesity crisis, understanding the effects of accumulative and long-term exposure to marketing outside of experimental research and exploring children's real-life experiences with food brands is critical.

The findings from this child-led research using a marketing task and the inclusion of participant-developed stimuli provided another perspective to understanding the influence of food marketing on children. This methodology identified the specific marketing techniques children have internalised and to which they claim to be responsive; children are very familiar with marketing techniques, strategies and branding, thus it is very pervasive and potentially persuasive. The World Health Organization advises that children require protection from targeted food marketing, under the United Nations Convention on the Rights of The Child (United Nations General Assembly, 1989), by ensuring the protection of children's health and privacy, including when they are participating in digital media (Tatlow-Golden, 2016). The associated report

recommends that there is a need when designing policy specifications to define "marketing directed at children" (Tatlow-Golden, 2016). Therefore, the current study has highlighted marketing practices that may be high priority areas for public health intervention and could assist action by public health practitioners and policymakers.


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### 4.2.8 Conflicts of interest

The authors declare no conflicts of interest. The Australian Research Council played no part in the study design, data collection, analysis and interpretation of data; or the writing of the report; or the decision to submit the paper for publication. RS has full access to all of the data in the study and had final responsibility for the decision to submit for publication.

## 4.3 Chapter summary

This chapter presented the findings from Study One, which addressed a gap in the evidence base by implementing child-centered qualitative methodology to explore the explicit associations and attitudes children have to their favourite branded food products. It demonstrated children were highly engaged with, and influenced by, the persuasive techniques used to market unhealthy foods. The

children identified the marketing techniques most appealing to children their age, and had clearly internalised and understood these techniques, as they could apply them creatively to hypothetically market similar products. The key themes were use of characters, place of exposure, fun, self-identity and branded jargon. The next chapter presents the findings of Study Two, which aimed to reveal the implicit responses children have to their favourite brands.

# 5.0 CHAPTER FIVE – STUDY TWO

## 5.1 Preface

The preceding chapter highlighted the explicit attitudes and associations children have with brands, whilst also addressing a key methodological gap in the body of evidence; that is, the lack of in depth qualitative examination of children's responses to branding and marketing techniques. The systematic review (Chapter Two) indicated there was a lack of research that involved the use of physiological measures. Physiological measures are important for understanding the implicit influence of food marketing.

This chapter explores the second research question: How do children's attitudes to their favourite branded food products manifest physiologically?

This chapter details the findings of Study Two, which were published in *The Journal of Environmental Research and Public Health*. It is presented as it was submitted with minor alterations in terms of formatting (such as table and figure numbering, spelling, and the referencing style) to maintain cohesion within the thesis and to conform to the University of Wollongong's referencing style which is Harvard.

**Citation:** Smith R., Kelly, B., Yeatman, H., Johnstone, S., Baur, L, King, L, Boyland, E., Chapman, K., Hughes, C., & Bauman, A. (2019). Skin conductance responses indicate children are physically aroused by their favourite branded

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**Author's contribution:** BK was the Chief Investigator of the study and led the writing of the initial study protocol and successful funding application. BK, HY, LB, LK, EB, KC, CH and AB were involved in the initial study protocol. **RS** led the study design, implemented recruitment and conducted the research. SJ, BK and HY also contributed to the conception and design of the study. **RS** led the analysis, in collaboration with SJ. **RS** drafted the manuscript. All authors contributed to critical revision of this manuscript and approved the final version.

## 5.2 Manuscript - Skin conductance responses indicate children are physically aroused by their favourite branded food and drink products.

### 5.2.1 Abstract

Children's favourite food and beverage brands use various tactics to foster positive associations and loyalty. This brand-consumer dynamic is frequently influenced by the use of implicit techniques and emotional appeals. Few studies have used physiological methods to examine the connections that brands build with children and the influence this has on their automatic responses. These techniques are potentially less prone to bias than behavioural or cognitive methods. This is the first study to explore the implicit response that children have to images of their favourite food and beverage brands using skin conductance responses as a marker of arousal. Australian children aged 8-11 years (N = 48) were recruited. Images of the participants' favourite branded food and beverage products, alongside images of the same products unpackaged, their family and friends, and neutral objects were presented in a randomised order with a standard timed interval between images. Children were significantly more aroused by branded images of their favourite food and beverage products than by their unpackaged counterparts ($p < .042$, $d = 0.4$). The physiological response to the branded products was similar to the response to the children's family and friends ($p = .900$, $d = -0.02$). These findings suggest that children may have an implicit connection to their favourite branded products.

### 5.2.2 Introduction

In Australia, one-quarter of children aged 5-12 years are overweight or obese (Australian Institute of Health and Welfare, 2015). Nutrition in childhood shapes lifelong eating habits and subsequently long-term health, as youth obesity is likely to persist into adulthood (Simmonds et al., 2015). Changes within the environment are one of a number of significant factors contributing to recent increases in overweight and obesity (Slomko et al., 2012), through surroundings and opportunities that promote obesity, known as the 'obesogenic environment' (Swinburn and Egger, 2002). A salient characteristic of modern society is the ubiquity of marketing, with marketing campaigns being so common that they are normalised into everyday experiences (Coalition on Food Advertising to Children, 2007). The marketing of unhealthy food and beverages is an example of an environmental prime, whereby food-cues encourage over-consumption (Harris et al., 2009a). It is, therefore, a key driver of the obesogenic environment and restricting children's exposure to unhealthy food marketing has been recognised as a global public health priority (World Health Organization, 2010).

Children are an attractive target population for marketers, for a host of reasons linked to the early establishment of brand relationships. For example, the development of brand loyalty, essential for maintaining consistent sales, is most lucrative when it begins at a young age, after which companies can anticipate a lifetime of loyalty and associated purchases (Bourquin et al., 2016). As a result, brands aim to create long-lasting relationships with children by fulfilling their symbolic and hedonic needs (MacInnis, 2012). This relationship is increasingly developed on an emotional level (Roberts, 2005), with a number of studies

noting the use of emotional appeals to engage children (Jenkin et al., 2014) and the staging of brands as tools for children to express themselves (Cătălin and Andreea, 2014). It is believed that from the age of two years old, children can identify and evaluate brands and products of preference when asking for presents (Macklin, 1994). Sequentially, as they grow children begin to use brands to express themselves as they develop self-concepts and participate in self-appraisals of how they view themselves (Baumeister, 1999, Chaplin, 2005). It is within the period between 7-13 years of age that emotional connections with brands increase in number and depth (Chaplin, 2005) and underlie long-term brand relationships (Keller, 2003).

Emotional advertising has also been highlighted as one of the most successful strategies in terms of sales and profit performance (Binet and Field, 2009). The use of implicit emotional appeal is problematic in defending against marketing's persuasive appeal, as when marketing operates at a subconscious level, children cannot rely on 'cognitive defences' that may protect them from marketing. Cognitive defences are activated when children recognise and acknowledge the persuasive intent of marketing stimuli and through understanding the effects of exposure, are then motivated to resist it (Harris, 2009). For example, the Food Defense Model requires that children must actively recognise the marketing content being presented in order to initiate their cognitive defences (Harris, 2009). This model thus contends that children would be unable to defend themselves if the marketing techniques subverted conscious processing.
It is well documented that food cues stimulate a set of automatic responses including increased heart rate, gastric activity, saliva, and skin conductance

level (Jansen et al., 2003, Nederkoorn and Jansen, 2002, Nederkoorn et al., 2000). However, less is known about the automatic reaction children have to branded and packaged foods to which they are favourable. Exploratory research with food products (King and Meiselman, 2010) and food brand choice (McGale et al., 2016) using methods originally designed to measure explicit cognitive processing (questionnaires and overt behavioural measures), has indicated that there are potential personal emotions and preferences for branded foods. Marketers typically strategise to induce brand preference by conditioning and appealing to subconscious motives (Alreck and Settle, 1999). Given that at least some of children's brand associations and attitudes are non-conscious, and this state is very difficult to retrieve consciously (Ekman, 1992), subjective measures of emotional state can be problematic. Moreover, when subjective techniques are used to measure the impact of marketing, such as self-report, they are prone to social desirability bias, demand characteristics, and peer influence. Methods that bypass conscious thought processes are less susceptible to these factors and therefore could be implemented to obtain objective data on children's responses to branded food and beverages.

As emotional appeals are documented as a frequently used tactic to engage children with food brands (Jenkin et al., 2014), it could be speculated that exposure to a liked brand or food product would be accompanied by an automatic emotional response. A 'non-conscious' measure of emotional response to food brands may be attainable through physiological and psychological changes such as autonomic and endocrine responses (Ekman, 1992, Kringelbach, 2004), whereby the arousal is thought to partially originate

from emotional processes (Critchley, 2002). Electrodermal activity (EDA) refers to the variation of the electrical properties of skin in response to sweat secretion and is used as a physiological arousal measure (Braithwaite et al., 2015). It includes both tonic (skin conductance level, or SCL) and phasic (skin conductance response, or SCR) measurements of electrical conductivity in the skin (Braithwaite et al., 2015). The eccrine sweat glands are involved in emotion-evoked sweating (Poels and Dewitte, 2006) and increased sweat gland activity has been documented as the body preparing itself for an appetitive response produced by a pleasant stimulus (Bradley et al., 2001). Measurement of psychological processes and the distinct neural mechanisms of pleasure thus may indicate the 'liking' of something (Berridge, 2009).

The measurement of skin conductance has previously been used in the marketing field to quantify emotion-related aspects related to liked and disliked brands (Walla et al., 2011). It has also been used in the health field to explore conditioned appetitive responses in adults (Andreatta and Pauli, 2015, Wardle et al., 2018) and to explore physiological responses to food packaging, whereby the findings concluded that the data could be used to anticipate product choice (Vila-López and Küster-Boluda, 2019). There are very few instances in the literature of the use of skin conductance with young children to explore their physiological responses to food (de Wijk et al., 2012) and the studies have not yielded conclusive findings so far.

A major benefit of measuring EDA is that it is simple and non-invasive, making it seem less intimidating than other physiological measures and a very

suitable measure for use with children. Due to these factors, and the universal acceptance of EDA as an effective measure of emotional arousal (Boucsein, 2012a), EDA presented as an appropriate measure for an implicit response to a branded food cue.

The purpose of the current study was to implement the measurement of EDA on an exploratory basis to determine whether it could detect an implicit response to branded food products. To measure and explore the nature of a potential emotional response to branded food products, the study required a marker of an existing emotional response. Therefore, images of the participant's friends and family were included in the study as an assumed existing emotional response, to act as a guide to compare to in determining if there was an emotional response to the branded products. The same products, unpackaged, which are are considered more directly appetitive and 'ready-to-eat' than foods in their packaging (Bailey, 2015), were also included to compare to. If the findings showed a stronger response for the branded products, then it could indicate a learned response facilitated by food marketing.

For this exploratory study, two novel hypotheses were developed to investigate the nature of the automatic response that children have to their self-nominated favourite brands. The favourite brands were packaged, and so they included several visual factors (e.g. the colours) and other unknown factors (e.g an image may have sparked a memory) that had potential to contribute to an arousal response. However, this study aimed to explore branded packaging as a whole, inclusive of the various prompts, marketing techniques and context that

ultimately led to the brand being selected.

Specifically, it was hypothesised that:

- SCRs to images of branded products will be larger than SCRs to images of unbranded (unpackaged with no brand identifiers) counterparts.
- SCRs to images of branded products will be similar to SCRs to images of the children's family and friends.

### 5.2.3 Materials and methods

Ethical approval for this study was obtained from the University of Wollongong Human Research Ethics Committee (HE16-233) (Appendix A). Informed written consent from parents and guardians was provided (Appendix C), as well as verbal assent by the children before participation (Appendix F). Data were collected between September 2016 and July 2017.

#### *5.2.3.1 Participants*

A total of 48 participants (31 male), aged 8-11 years (9.2 years ±1.07) (mean±SD) were recruited through opportunity and snowball sampling in the Illawarra region of New South Wales, Australia. This age group was selected as they were considered to be vulnerable to the influence of food marketing (Rozendaal, 2010) and rely on superficial cues from brands to guide their product evaluations (Achenreiner and John, 2003). Parents of child participants were initially engaged via flyers around the University Campus, in school newsletters, and advertisements of the study were placed on social media using the Facebook Advert Manager. Following completion of the experiment, the

parents of participants were asked if they would recommend the study to other parents in their social networks. Socio-economic status was documented by recording participants' postcodes. The SEIFA Index of Disadvantage for Wollongong City and Shellharbour City (Australian Bureau of Statistics, 2016) indicated participants were from low (23%) and medium (77%) socioeconomic areas. This was slightly less disadvantaged than the average population in the recruitment locale (Australian Bureau of Statistics, 2016).

*5.2.3.2 Materials*

Participants were given a week to supply five photographs of their favourite branded food and beverage products. Requesting images from participants has been employed previously in academic research, in the form of a visual sociology technique called 'Autodriving'. Autodriving is a photo-interviewing technique where in place of being given stimuli, the images are taken by the participants themselves, indicating that the study is 'driven' by the photographer (Heisley and Levy, 1991). This was important to ensure the images used were definitely relevant to the participants.

A photo guide was provided (Appendix D) and instructed that the images should be taken in the following way: the product had to be in its original packaging; there was only one product per photograph; there was a neutral background. Aside from the criteria listed in the guide, participants were free to choose what their favourite brands were to ensure that their choices were genuine and representative. Participants were also asked to provide five photographs of their closest family members and friends (Appendix E). A file for each participant

was created consisting of five images for each of the following categories: Branded Food & Beverage, Family & Friends, Unpackaged Food & Beverage, and Filler images. The filler images were neutral images (not related to food or beverages), such as a brick wall, which were all sourced from the Open Affective Standardized Image Set (Kurdi et al., 2016) and had been categorised with low arousal ratings. The 'Unpackaged Food & Beverage' file referred to images of the participant's favourite branded food and beverages without the packaging on (e.g. an unwrapped chocolate bar), that had been sourced from Google Images by the lead researcher (RS). All of the unpackaged stimuli were clearly recognisable, with a white background, and had no further branding on the product itself.

*5.2.3.3 Procedure*

At the beginning of the visit, the participant was encouraged to feel comfortable with the equipment and once they understood the testing procedure, a baseline measure of skin conductance level (SCL) was recorded for two minutes (participants focused on a black cross travelling on the screen). Following this, participants were asked to focus on the laptop screen for approximately five minutes whilst the images were randomly presented, and their arousal level was measured. Upon completion of the study, participants were thanked and given a $10 voucher as reimbursement for their time.

*5.2.3.3.1 The paradigm for arousal measurement*

A commercially-available research-grade device (Simple Scope 2000, UFI, CA) measured the participant's EDA for the duration of the experiment. Visual

stimuli (20 images per participant) were presented on a laptop screen using the Presentation software package (Version 18.3, Neurobehavioral Systems, CA). The 20 images were presented in a randomised order for a duration of 5 s, preceded and followed by a black screen for 8 s. Several factors influenced the duration time chosen for the stimuli display duration and black screen duration: the 'unremarkable' nature of the stimuli, the time needed for the SCR to occur and return to baseline levels, and the participant's attentive state during the study (i.e. ensuring the participant did not become bored). As EDA is known to decline throughout the duration of a task (Rushby et al., 2007), EDA was also recorded during the black screen (between each stimulus).

Two Ag-AgCl electrodes (1080FG, UFI, CA) were taped to the distal phalanges of digits I and II, on the participants' non-dominant hand. A small amount of biopotential contact medium gel (Biogel 1090, UFI, CA) was applied to the electrodes and a constant voltage of 0.5 V was applied across the electrode pair. The experiment was conducted in a suitable environment for the EDA measurement; a quiet room that was free of distractions, with medium level lighting, and at a temperature of approximately 22-24 degrees Celsius (Braithwaite et al., 2015). Participants were asked to sit still and limit movement of their hand to avoid disturbance in the EDA measurement.
The Presentation software delivered stimulus markers to the Simple Scope device to record the precise moment that each event (i.e. image, blank screen) occurred, allowing accurate pairing of the events and physiological data.

*5.2.3.4 Data analyses*

EDA was recorded in microsiemens (μS). Data collected for each participant included the EDA during the pre-task baseline, stimulus delivery and black screens. The pre-task baseline data was not included in the analysis reported because the pre-stimulus baseline (black screens) provided a more appropriate and reliable measure of the child's unstimulated arousal level, accounting for fluctuations throughout the task. The pre-stimulus baseline was also more accurate because the children had adjusted to the apparatus, whereas the majority of the pre-task baselines were unrealistically high due to heightened arousal and nerves from beginning the study. SCRs were quantified using a purpose-built script in MATLAB programming software (MathWorks, 2018). The onset of a response to stimuli was categorised by a minimum 0.1 μS increase above the mean level of the last 4 s of the preceding pre-stimulus baseline. A SCR was considered valid if the following criteria were met: if the SCR showed an onset in the 1-4 s post-stimulus period (Boucsein et al., 2012); and if the SCR showed a peak during the 5 s subsequent to the onset (Boucsein et al., 2012). SCR amplitude (SCR-amp) was calculated as the change from the onset to the peak (Alexander et al., 2005). SCR-amp was then averaged for each stimulus type for each participant and examined using IBM SPSS Statistics Package Version 25.0 for Windows (IBM Corp, 2017). As a Shapiro-Wilk test indicated that the data for each stimuli type was normally distributed, parametric statistical testing was used.

A repeated measures analysis of variance (RM ANOVA) with a within-subject factor of stimulus type (Branded Food & Beverages, Family & Friends, Unpackaged Food & Beverages) was conducted on the SCR data. To test the

hypotheses, data was analysed using two a-priori planned contrasts. The first contrasts compared the Branded Food & Beverages to Unpackaged Food & Beverages. The second contrasts compared Branded Food & Beverages to Family & Friends. As the contrasts are planned, and there are no more of them than the degrees of freedom for the effect, no Bonferroni-type adjustment to α is required (Tabachnick et al., 2007).

### 5.3.4 Results

The mean skin conductance amplitude (SCR-amp) for each stimuli type are detailed below in Table 5.1. The RM ANOVA with planned contrasts examined differences between stimulus types ($F(3, 4.61) = 3.42$, $p < 0.19$) (illustrated in Figure 5.1). The first contrast indicated that the SCR to images of Branded Food & Beverages (1.24 μS) was significantly larger than to the images of Unpackaged Food & Beverages (0.64 μS) ($F(1, 47) = 4.37$, $p < 0.042$). Cohen's effect size value ($d = 0.4$) suggested a low to moderate practical significance. The second contrast indicated that there was no difference between the SCR to images of Branded Food & Beverages (1.24 μS) and images of Family & Friends (1.27 μS) ($F(1, 47) = 0.16$, $p = 0.900$). Furthermore, Cohen's effect size value ($d = -0.02$) suggested a very low practical significance.

**Table 5.1** Mean skin conductance amplitude (SCR-amp)

| Unbranded Foods & Beverages | Branded Food & Beverages | Family & Friends | Filler |
|---|---|---|---|
| 0.64 | 1.24 | 1.27 | 1.27 |

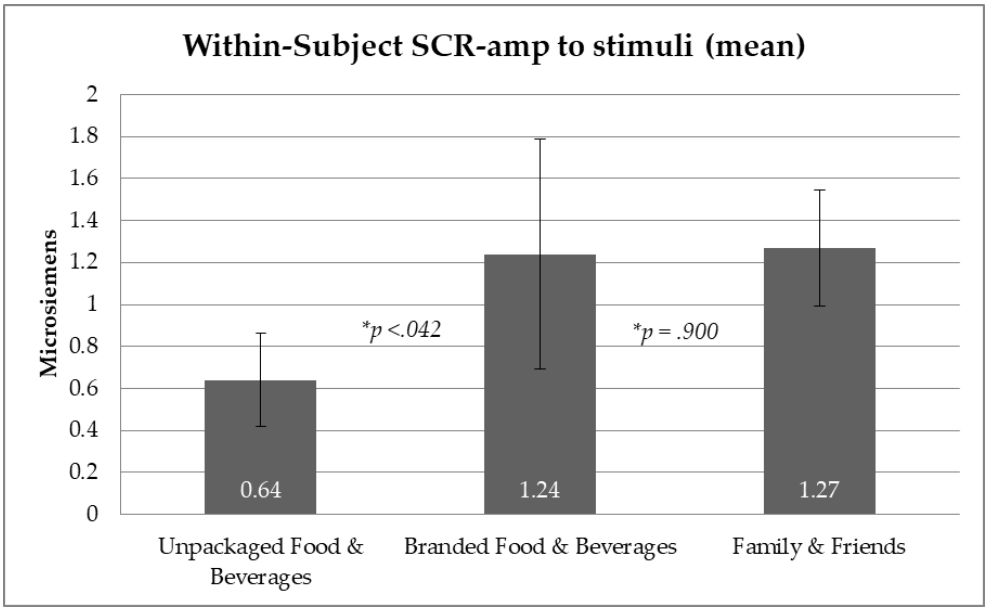


**Figure 5.1** Skin conductance responses to Unpackaged Food & Beverages, Branded Food & Beverages and Family & Friends, with 95% confidence intervals.* Indicates significance value between conditions.

### 5.3.5 Discussion

This exploratory study sought to explore a potential implicit response emotional relationship that children may have with their favourite food and beverage brands, indicated implicitly by a physiological response to visual stimuli. The measurement of EDA highlighted contrasting responses to the same food and beverage products, dependent on how they was presented, revealing a potential emotional connection that may underlie children's favourite branded products.

The most interesting finding was that there was evidence of a significant difference in children's arousal when viewing branded food and beverage products compared to their unpackaged counterparts. The responsiveness to products in their branded packaging versus the actual product unpackaged was identified despite evidence that unpackaged foods can be perceived as more accessible, directly appetitive and have previously shown better physiological appetitive responses than packaged products (Bailey, 2015). This novel discovery supports the notion that children may have an emotional relationship with their favourite brands, which is a result of branding and marketing and is less determined by the product itself.

Further, similar arousal responses were found for images of the participant's favourite branded products and images of their family and friends. The combination of these findings may help us to understand the strength of the connection that the participants have with their favourite food and beverage brands. These findings suggest that children felt a similar level of connection with their favourite food and drink brands to their family and friends. In other words, children may have exhibited the equivalent response to that of their relationship with their family and friends via a parasocial relationship that had developed with their favourite brands.

This finding is unsurprising as it has been previously noted that brands strive to make deep connections with children, particularly in the long-term to control their loyalty to the brand over their lifetime (Bourquin et al., 2016, Keller, 2003, Mininni, 2005). As a result, it is likely that this response is due to the

pervasive and powerful marketing techniques that are used to promote products to children, such as attractive packaging, which has been recognised as the strongest predictor of choice of packaged food products (Van der Laan et al., 2012).

#### 5.3.5.1 Strengths of the study

Utilizing EDA, an implicit measure with child participants ensured that unbiased results could be obtained that were free of social desirability - a common drawback of using subjective methodology.

Fifty percent of the images used in the study were directly selected by participants (specifically all of the favourite brand photos and family and/or friend photos), in contrast to the majority of previous studies that have explored the influence of food marketing using pre-determined (researcher selected) food and beverage brand stimuli. The application of participant-nominated stimuli in this study assured that valid arousal stimuli were used in the evaluation of the associations and relationships that children may have with their favourite brands.

Finally, a post hoc power calculation showed that with a significance of 0.05 and effect size of 0.4, our sample of 48 had high statistical power (0.86).

#### 5.3.5.2 Limitations

An imperfection of research that employs physiological methodology is the variation across individuals. Some individuals might respond with a larger

increase in arousal with the EDA than other physiological measures, whilst other individuals might show smaller increases in arousal but greater changes in other measures (Revelle, 1992). Similarly, the nature of the current study may have been particularly stimulating or dull for different individuals. For some, it may have been un-arousing to sit and watch a somewhat repetitive screen for five minutes, thus their overall arousal level may have been low and the image categories were not stimulating enough to elicit a notable arousal change. Other participants may have experienced heightened arousal levels from taking part in the experiment and therefore insignificant fluctuations in arousal may have occurred.

In addition, the stimuli acquisition arrangement could have influenced the arousal responses. The participants were already familiar with the branded food images and family and/or friends photographs due to being involved with the capturing and reviewing of the images. Therefore, those photographs would have been familiar compared to the unpackaged photographs and children may have associated them with a positive experience. However, this did not necessarily determine the results as familiarity could have also led to lower arousal due to a lack of novelty.

Lastly, EDA only indicated the intensity of emotional arousal, so this study may have lacked an additional measure to capture emotional valence (positive or negative emotion), such as self-report, to potentially provide further insight into which stimuli were liked the most. However, this was considered unnecessary; as it was assumed participants would have a positive valence to images of their

friends and family, favourite brands, and therefore also to the images of the favourite brands unpackaged.

#### 5.3.5.3 Implications for future research

The nature of children's automatic responses to their favourite branded products, when compared to other stimuli such as their family and friends and unpackaged food and beverages, suggests that children have a strong implicit response to their favourite brands. Questions remain regarding further detail to these relationships. A natural progression of this work would be to consider further use of EDA in the exploration of emotional connections between children and food and beverage brands. For example, to fully understand the emotional relationship, it would be important to ascertain the age that the physiological response first manifests by measuring EDA in younger participants.

It would also be interesting to understand what aspects of the branded products can induce a physiological response of liking. That is, there may be specific aspects of the brand imagery that are emotionally arousing or induce an appetitive response. It may be the case that specific persuasive appeals or food cues or cheeky content of food marketing may be responsible for triggering responses. EDA could next be used to investigate which particular marketing techniques produce a higher degree of response amongst common themes, such as the presence of cartoon characters, fun and humour.

In recognition of the value of using physiological methodology in this area,

other physiological measures could also be considered for their effectiveness at measuring implicit preferences for food and beverage brands. Alternative neurological methods such as Functional Magnetic Resonance Imaging (fMRI) and the Electroencephalogram (EEG) could be considered. fMRI studies have been used for examining neural responses to product brands in children of a similar age (Bruce et al., 2014) and EEG studies have shown that bipartite activations can indicate responses to positive and negative stimuli (Jones and Fox, 1992). The frontal lobe asymmetry model allows consideration of EEG asymmetry and provides an index of approach motivation corresponding to greater activation on the left side of the brain. However, the participant burden needs consideration; the application of these methods is more complicated than for EDA and children would be required to remain extremely still for the apparatus to produce clear images.

#### 5.3.5.4 Conclusions

The implementation of a physiological measure illuminated another dimension to the response that children have with branded food and beverages. It was demonstrated that branded products generate an implicit response, greater than that of an unembellished food cue, a usually more appetising and biologically motivating food cue (Bailey, 2015). This response suggests that powerful marketing techniques have guided and fostered strong connections with children.

There is merit in using innovative methods in brand-consumer research, as methodology that achieves unfiltered and unbiased responses could reveal rich insights in this area. Given the feasibility and acceptability of the methodology,

future research into brand associations and relationships should continue to investigate the implicit mechanisms that drive brand preferences and could consider implementing a range of physiological methods that will reveal further ways in which individuals respond to food marketing.

## 5.4 Chapter summary

This chapter presented the findings from Study Two, which addressed a gap in the evidence by implementing a physiological measure to explore children's attitudes to their favourite branded food products. The methodology was successful in revealing children have an implicit response to their favourite branded products. Children were significantly more aroused by branded images of their favourite food and beverage products than by their unbranded counterparts (i.e. the same products without the packaging). This physiological response to the branded products did not statistically differ to the child's response to their family and friends suggesting the children had made strong relationships with their favourite brands. The following chapter will address the third research question by presenting the findings of Study Three. This study aimed to explore the influence of food marketing using contemporary advertising techniques in online games.

# 6.0 CHAPTER SIX – STUDY THREE

## 6.1 Preface

The previous chapter identified children have an implicit response to food marketing. Numerous marketing techniques influence implicit processing, which in turn influences brand attitudes and, possibly purchase and consumption behaviours. Marketing techniques are proliferating across interminably-evolving new media. The systematic review (Chapter Two) did not find any studies that explored the impact of advertising within online gaming on children's attitudes, preferences and consumption – other than advergames. Advergames operate covertly and rely on the unconscious processing of cues, thought to be the reason for their effectiveness. However, as the literature has only explored advergames thus far, this highlighted a need to explore the impact of commonly used contemporary techniques that are yet to be evaluated from a critical academic perspective. Literature has also recommended measuring the impact of marketing techniques using unfamiliar stimuli to determine an influence in the absence of existing brand associations and attitudes (Kelly et al., 2015a). Therefore, this study aimed to use these opportunities.

This chapter explores the third research question: How do contemporary game design techniques used to market an unfamiliar food product influence children's attitudes, preferences and consumption?

This chapter details the findings of Study Three, which has been accepted for publication by the *Journal of the Academy of Nutrition and Dietetics* and is

currently in the process of being published. It is presented as it was submitted with minor alterations in terms of formatting (such as table and figure numbering, spelling, and the referencing style) to maintain cohesion within the thesis and to conform to the University of Wollongong's referencing style which is Harvard. All copyrighted and trademarked brand names, videos, and images are the property of their respective owners, but are used in this research study under the "Fair Dealing" doctrine.

**Citation:** Smith, R., Kelly, B., Yeatman, H., Moore, C., Baur, L., King, L., Boyland, E., Chapman, K., Hughes, C., & Bauman, A. Advertising placement in digital game design influences children's choices of advertised snacks: a randomized controlled trial. *The Journal of the Academy of Nutrition and Dietetics* (accepted for publication).

**Author's contribution:** BK was the Chief Investigator of the study and led the writing of the initial study protocol and successful funding application. BK, HY, LB, LK, EB, KC, CH and AB were involved in the initial study protocol. **RS**, CM, BK and HY contributed to the design of the study. **RS** registered the study with the Australian New Zealand Clinical Trials Registry. BK and HY supervised **RS**. **RS** implemented the study protocol, including recruitment. **RS** led the statistical analysis, supervised by BK, HY and a statistical consultant. **RS** drafted the manuscript. All authors contributed to the critical revision of this manuscript and approved the final version.

## 6.2 Manuscript - Advertising placement in digital game design influences children's choices of advertised snacks: a randomized trial.

### 6.2.1 Abstract

Background: Children are inhabitants of a media-rich environment rife in extensive, sophisticated and persistent techniques that are used to market unhealthy food. Exposure is known to influence children's attitudes, choices and consumption, yet further research is required to explore the impact of contemporary techniques within online games.

Objective: To explore the impact of modern advertising on children's attitudes, choices and consumption, techniques (banner advertising, advergame, and rewarded video advertising) were used to promote an unfamiliar confectionery brand within an online game.

Design: A between-subjects randomised experimental study.

Participants/setting: Children (aged 7-12, *n*=156) were recruited in New South Wales, Australia between September and November 2017.

Intervention: Children were required to play a four-minute online game, complete some questionnaires and choose one snack to consume afterwards. Children were randomly assigned to one of four conditions: a control group with no advertising, and three experimental conditions that promoted an unfamiliar confectionery brand via a banner advertisement, advergame or rewarded video

advertisement.

Main outcome measures: Questionnaires included the assessment of attitudes to the test brand pre and post the game, enjoyment of the game and children's awareness of advertising. Food choice was recorded and food consumption was measured by weighing the snack in grams, which were translated into kilocalories.

Statistical analyses performed: Statistical tests included ANOVAs, Kruskal-Wallis and Chi-Square.

Results: Attitudes towards the perception of 'fun' ($p = 0.06$) and 'taste' ($p = 0.21$) of the test brand were not influenced by condition. Children who were exposed to the rewarded video advertising chose the test brand significantly more than children in the other three conditions ($p < 0.002$). Condition did not influence overall energy intake measured in grams ($p = 0.78$) or kcals ($p = 0.46$).

Conclusions: Children's choice of the test brand was significantly influenced by the rewarded video advertising condition (compared to the control, banner advertising and advergame conditions). This technique is prevalent across online and application games that children play yet the effects of using rewarded video advertising to promote food brands have not been explored before from a public health perspective. Therefore this study has contributed to the understanding of modern strategies used to market unhealthy foods to

children.

Trial registration: ANZCTR, ACTRN12617001313325 (Appendix J). Registered 9 September 2017, www.anzctr.org.au/actrn12617001313325.aspx. This research was supported by a grant from the Australian Research Council (LP140100120) and the Cancer Council NSW (Linkage Grant Partner).

### 6.2.2 Introduction

The marketing of unhealthy food and beverages is a key component of the obesity-promoting environment (Tatlow-Golden, 2016, World Health Organization, 2010) and exposure to food advertising leads to an increased preference for, and consumption of, unhealthy foods, with the magnitude of effects greatest in children who have the highest exposure (Boyland, 2016). These outcomes of exposure have been identified as critical components in the series of events that lead to an unhealthy choice or purchase, and ultimately consumption, diet and weight by the Hierarchy of Effects model (Kelly et al., 2015a). As such, reducing exposures to unhealthy food and beverage marketing has been prioritised as a population-based intervention to alleviate non-communicable diseases by 2025 (World Health Organization, 2011).

Children live in a media-saturated environment (Kostyrka-Allchorne et al., 2017) in which screen time has become the predominant recreational activity (Sigman, 2015). Society today hosts a record high number of young children online, mostly due to increased ownership of handheld devices (Ofcom, 2018). UK children aged 5-15 years spend over 15 hours per week online (Ofcom,

2018), and mobile games (tablet and smartphones) account for 43% of the games market (USD$50.4 billion in 2017) (Wijman, 2017). Consequently, food advertising expenditures have seen a shift from child-directed television advertising to increased spending on digital advertising (Federal Trade Commission, 2012).

Advertising is ubiquitous across popular children's websites (Alvy and Calvert, 2008, Kelly et al., 2008a, Potvin Kent and Pauze, 2018) and in children's online games (European Commission, 2016). The most frequently visited children's websites contain multiple food marketing instances, with display advertisements (online advertising that comes in many forms, e.g. banner advertisements - an electronic advertisement that appears on the top or bottom of a webpage (BusinessDictionary.com, 2018a) the most prominent (Alvy and Calvert, 2008), followed by product placement (the planned and unobtrusive entry of a branded product into media (Balasubramanian, 1994) and advergames (an online video game that promotes a particular brand or product by integrating it into a game (Alvy and Calvert, 2008, Dictionary.com). Moreover, the US Rudd Centre for Food Policy and Obesity have also highlighted the prevalence of display advertisements for food and beverages across children's websites, calculating that during an 11 month period, there were more than three billion impressions for food and beverage advertisements (Ustjanauskas et al., 2014). This is of concern because children experience more difficulty recognising display advertisements online versus advertisements in television (Ali et al., 2009).

In the context of the game itself, advertising is also commonplace (Culp et al.,

2010, European Commission, 2016), which leading national advertisers implement in two main ways: advergames and in-game advertising (Lee, 2008). Advergames are either created by, or sponsored by a company (BusinessDictionary.com, 2018b) and facilitate a brand-rich gaming environment by embedding the brand product or logo into a game (Culp et al., 2010). Alternatively, in-game advertising involves the placement of an advertisers brand into an existing commercial game to promote their products or services (Lee, 2008). Advergames are found on two-thirds of websites belonging to food manufacturers (Weber et al., 2006) and a significant concern with children's interactions with advergames is how easily the true intent behind the game can be disguised (Vanwesenbeeck et al., 2017). This is likely to be because the game design allows brands to blur the boundaries between advertising and entertainment (Shrum, 2012). These techniques operate on implicit mental processes, with the aim to increase familiarity and likeability of the brand (Coates, 2006, Culp et al., 2010, Kuo, 2015, Mathiot, 2010). The likeability of the brand is often influenced by using branded game components (Culp et al., 2010), as enjoyment and successes in the game are associated with the brand (Culp et al., 2010, Kuo, 2015).

In-game advertisements are predominant within the most popular children's online games (European Commission, 2016) and application games (Meyer et al., 2018). It is believed to be the most difficult advertising practice for children to understand (Owen et al., 2013) and it is likely that the confusion is due to the integrated nature of the advertisements. Dynamic advertising is a component of in-game advertising (Raatikainen, 2012), advertisements that can be integrated

into the gameplay in either a subtle or prominent manner (Terlutter and Capella, 2013). These advertisements have a playful role in the game. That is, advertisements are incorporated as a part of the game strategy, story and outcomes as a major component of play, such as an advertisement that the player must watch before progressing to the next level or unlock play items (Meyer et al., 2018). This is known as 'rewarded video advertising' and involves the incentivised exchange of the users attention on the advertisement for additional game features (Weaver, 2018). In-game advertising, most commonly rewarded video advertisements (Robinson, 2017), frequently appear on games that operate on a 'freemium' model, providing free gameplay and rewarding players for 'consuming' advertising (Ladeira et al., 2016). This model reduces the barrier to access, as the game cost is zero, yet children are exposed to more advertising (Meyer et al., 2018). This is of concern because consumers are more likely to agree to install a free game (with advertising) than a paid game (without advertising) (Business Insider Intelligence, 2017, Meaola, 2016). The link between the emotional response generated through game progression (Christy and Kuncheva, 2018) and the associated advertising, influences the players' positive affective state, thought to contribute to the ideal circumstances for viewing advertisements (Baumgartner et al., 1997).

Previous studies have investigated the impact of advertising techniques used within gaming, and have demonstrated the influential power of advergames on children's food choice and consumption post exposure (Dias and Agante, 2011, Folkvord et al., 2013b, Neyens et al., 2017). Studies have shown a food cue (Folkvord et al., 2013b) or a branded food logo (Neyens et al., 2017) in an

advergame influences children's subsequent food-related behaviour. However, there are numerous other game design techniques (Alvy and Calvert, 2008) that are widely adopted by the food industry to promote products (Hennessy, 2014). Considering that children play a broad range of games food manufacturers can embed with advertising (in-game advertising), not only food manufacturer-owned advergames (An and Kang, 2014), more research is required to explore the power of these individual techniques on children's food behaviours.

This study aimed to explore the impact of contemporary food advertising techniques within online games on children's food brand attitudes, choices and consumption behaviours. It was hypothesised that, compared with children who played an online game with no food advertising, those who played the game with food advertising would:

1) Have a more favourable attitude towards the advertised brand
2) Choose the advertised brand more frequently and
3) Consume more of the advertised product immediately after playing the game

It was also hypothesised that children's awareness of food advertising would differ across the different advertising techniques used in the online game

### 6.2.3 Materials & Method

Ethical approval for this study was obtained from the University of Wollongong Human Research Ethics Committee (HE17-311) (Appendix I) and the study was prospectively registered with the Australian and New Zealand Clinical Trials Registry (ACTRN12617001313325, on 13/09/2017) (Appendix J).

Participants aged 7-12 years were recruited via opportunistic sampling, including two childcare organisations (a University of Wollongong school holiday camp, and an afterschool care provider) (Appendix K and Appendix L) in the Illawarra region, New South Wales, Australia. Both providers were contacted and informed that participation of the children was voluntary. Informed written consent was obtained from parents and guardians (Appendix O and Appendix P), as well as verbal assent by the children before participation. Data were collected at the Illawarra Health and Medical Research Institute at the University of Wollongong during the school holidays, and five afterschool care centres across the Illawarra during term time between September and November 2017.

*6.2.3.1 Study design*

The randomised controlled trial utilised a between-subject design with four conditions (control and three experimental advertising techniques). Each child was required for a one-time 25-minute visit and was randomly assigned to each condition via a computerised randomisation list. The session times ran from 11 am to 5 pm and the participants were asked to refrain from eating an hour before taking part.

*6.2.3.2 Materials and measurement tools*

*6.2.3.2.1 The test brand*

The confectionery brand 'Rowntree's Randoms©' was chosen as the test brand. This is a UK product not sold in Australia, and so was highly likely to be unfamiliar to Australian children. It was crucial to use an unfamiliar brand in

order to measure the effects of exposure to the experimental advertising techniques in the absence of pre-existing brand attachments or attitudes.

*6.2.3.2.2 The test foods*

To explore the influence of the advertising techniques on choice and consumption, participants were required to choose one snack from a selection of four items (grapes, and three types of confectionery, weighing 100g each) immediately after playing the online game for four minutes. It was important to induce a choice of one item as to determine a desire for a specific snack after playing the game. All snacks were labelled and presented in small white, opaque cardboard tubs, so that the participant's choices were not influenced by visual cues of the product, and were made on the name or brand alone. The items were labelled with an adhesive sticky label, stating 'Green Grapes' or 'Gummy Lollies' (Appendix U). Each tub of 'Gummy Lollies' included further information on the label stating either: 'Supermarket Brand' (text only), Rowntree's Randoms© (text and logo) or Squashies© (text and logo). The second unfamiliar brand (not included in the game), Squashies©, was included to assess whether children were more likely to favour an unfamiliar brand over another, if they had been exposed to advertising of one of them. It was also included to explore if the effects of advertising an unfamiliar item would extend to influence the choice of another unfamiliar brand.

Food choice was measured by recording the snack that each participant chose within their condition. Participants' energy intakes were measured by recording the weight in grams of the chosen snack before and after consumption. This

amount was then converted into kcals to determine energy intake using Foodworks 8 nutrient analysis software (Xyris Software, 2015).

*6.2.3.2.3 The online game*

The online game and all experimental modifications across conditions were built by a professional digital game developer. This facilitated manipulation of several elements, including the advertising techniques, the duration of the game, and most importantly, the incorporation of the test brand. The game was a web-based side-scroller game, designed to mimic other popular online games, in which the player had four minutes to help their avatar, an alien, collect as many coins as they could. The avatar, named 'Ziggy', was chosen to enhance the novelty of the game and provided a gender-neutral avatar to be equally appealing to all participants. The game experience was almost identical for all participants, yet varied slightly across the different conditions, dependent on the advertising technique used. The four configurations of games with their associated advertising techniques (Table 6.1) included a control condition and three experimental conditions, consisting of banner advertising, an advergame, and rewarded video advertising.

**Table 6.1 The four game conditions used as interventions - one control condition and three experimental conditions that included different advertising techniques (banner advertising, an advergame and rewarded video advertising)**

| Game condition | How the marketing technique was integrated |
|---|---|
| Control | Game with no advertising techniques (no instances of Rowntree's Randoms©). Participants instructed to collect as many coins as they could before the time finished. |

| | |
|---|---|
| Experimental - Banner advertising | Game with *rectangular banner advert for Rowntree's Randoms©* directly beneath the game on-screen. Participants instructed to collect as many coins as they could before the time finished. |
| Experimental - Advergame | Game with *Rowntree's Randoms© brand logo and product included as game pieces*, which were given a *higher point value* than the coins. Participants were instructed to collect as many coins as they could before the time finished but to also collect as many as they could of these pieces, as they were worth the highest value. |
| Experimental – Rewarded video advertising | Participants instructed to collect as many coins as they could before the time finished. Game with *video advertisement of Rowntree's Randoms©* that appeared when the player arrived at an image of a lock. The advertisement paused the game and played (with sound) covering the game screen for 30-seconds before automatically closing. After the advertisement finished, *a new level was unlocked* (a different background setting was in place where the coins were worth a higher value). |

The banner advertisement and video advertisement used were both genuine marketing collateral by Rowntree's Randoms© (Nestlé), downloaded from the internet and YouTube.com. The game pieces were made using the Rowntree's Randoms© logo, and an image of the confectionery that they manufacture, which were also downloaded from the internet.

*6.2.3.2.4 Questionnaires*

All survey tools were pilot tested by the lead author with a small group of children, to ensure each age group understood the tools. All questionnaires were read aloud to the children. Subjective appetite ratings were recorded using a five-point Likert scale in a pictorial format for children; with the anchors "I am really hungry" and "I am not hungry at all" (X Sinopoulou et al., 2015) (Appendix Q). A logo questionnaire was constructed for administration pre- and

post-game intervention to assess recognition and attitudes towards the test brand (Appendix R). The intention of this assessment was masked by the inclusion of five other food and beverage brands for the child to rate. To record attitudes, the logo recognition questionnaire used a five-point Likert scale with two adjectives as the anchors, that had been adapted from a scale by Dixon *et al.* (2007) (Dixon et al., 2007). They were asked if they thought the brand was either 'Yucky or Yummy' to indicate perception of taste, and 'Boring or Fun' to indicate perception of fun, with a higher rating indicating a more positive opinion. Participants were also asked in a post-game questionnaire about their awareness of advertising during their time playing the game, which was assessed with a 'yes/no' to whether they saw any, followed by several probing questions to confirm whether this response was true (e.g. confirming with the child where they saw the placement of the advertising) (Appendix S). Enjoyment of the game was also measured on a five-point Likert scale (Boring to Fun) (Appendix T). Demographic information was captured including sex, age and residential postcode. Residential postcode was used to identify the SEIFA index of disadvantage (Australian Bureau of Statistics, 2016).

*6.2.3.2.5 Anthropometric measures*

Many studies that have measured the influence of food marketing have found the greatest effect (and sometimes only effect) on energy intake in children with overweight (Halford et al., 2004b). Participants' height and weight were measured using scales and a stadiometer at the end of their participation to classify their weight status into body mass index (BMI) categories. The measurements were undertaken in private by trained staff using standard

procedure (with clothes and no shoes) and neither the child nor any subsequent children saw the measurements recorded. BMI was classified using the World Health Organization child growth standards for age (5-19 years) (World Health Organization, 2007).

#### *6.2.3.3 Procedure*

##### *6.2.3.3.1 Sampling*

The minimum sample size of n = 136 participants was based on an estimation to ensure sufficient statistical power (80%) to assess a difference in energy consumption of 68kcal, with a significance of 0.05, derived from published data in a similar online game study using the differences in reported energy intake between conditions (Folkvord et al., 2013b). The calculation was based on the energy intake effect because of previous television studies that have found significant outcomes in consumption (Boyland, 2016).

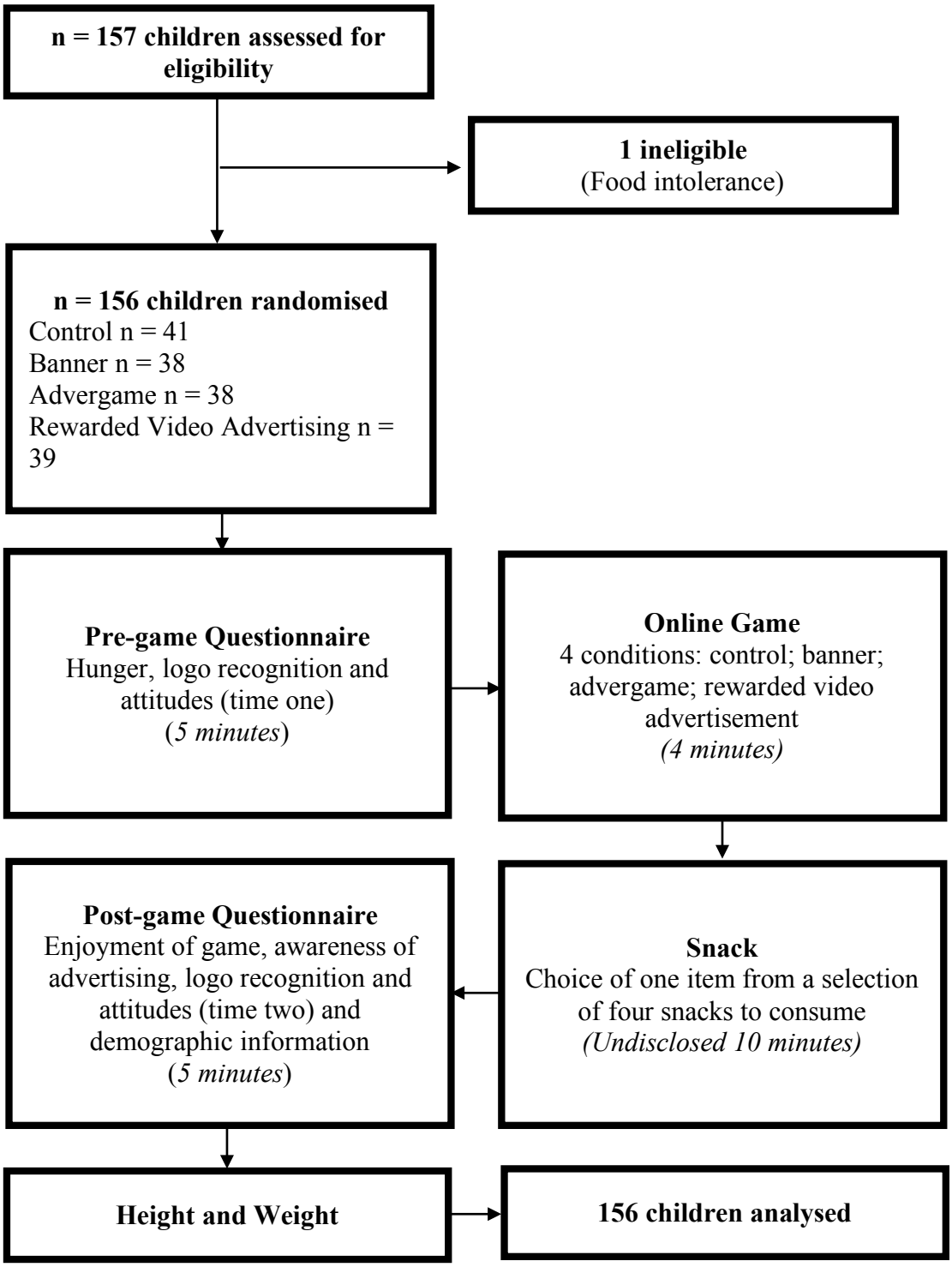


**Figure 6.1 A Consort flow diagram of the participant selection process that includes the study design**

In the snack component of the design, each participant was given an undisclosed eating time of ten minutes to eat their chosen snack. The researcher also gave a

reason for needing to leave the room so that the participants were not being watched as they ate, which aimed to make them feel more comfortable to eat the amount that they liked.

*6.2.3.3.2 Statistical analysis*

All data met normality assumptions and due to the variation of discrete and continuous data, both parametric and non-parametric tests were used. To test whether food advertising led children to have a more favorable attitude towards the advertised brand, perception of 'taste' and 'fun', pre and post-game, were tested using two Kruskal-Wallis tests. To determine whether food advertising influenced children's choice of the advertised brand, snack choice was tested using Chi-Square. To test whether food advertising influenced children's consumption of the advertised product, energy intake (for both grams and kcals) was tested using a one-way ANOVA. Enjoyment of the game was tested using Kruskal-Wallis and awareness of advertising was tested using Chi-Square. All analyses used a significance level of 0.05 and were examined using the IBM SPSS Statistics Package (IBM Corp, 2017).

### 6.2.4 Results

*6.2.4.1 Sample characteristics*

**Table 6.2 Participant characteristics (sex, age & BMI) of a cohort of 156 children aged 7-12, arranged by the game condition they were randomly allocated to**

| | Control (n= 41) | Banner advertising (n= 38) | Advergame (n= 38) | Rewarded video advertising (n= 39) | All (n=156) |
|---|---|---|---|---|---|
| **Sex, n (%)** | | | | | |
| *Male* | 23 (56%) | 18 (47%) | 21 (55%) | 23 (59%) | 86 (55%) |
| *Female* | 18 (44%) | 20 (53%) | 17 (45%) | 16 (41%) | 70 (45%) |
| Age, years (mean±SD) | 8.4±1.4 | 8.6±1.6 | 8.9±1.5 | 8.9±1.4 | 8.7±1.5 |
| **BMI (Body Mass Index)[ab], n (%)** | | | | | |
| *Severe Thinness* | 1 (2%) | 2 (5%) | 2 (5%) | 0 (0%) | 5 (3%) |
| *Thinness* | 2 (5%) | 2 (5%) | 3 (8%) | 2 (5%) | 9 (6%) |
| *Normal* | 25 (61%) | 26 (68%) | 20 (53%) | 25 (65%) | 96 (62%) |
| *Overweight* | 8 (20%) | 3 (8%) | 6 (16%) | 7 (18%) | 24 (15%) |
| *Obesity* | 5 (12%) | 5 (13%) | 7 (18%) | 4 (10%) | 21 (13%) |

[a] 1 person did not want their height and weight recorded
[b] BMI was classified using the World Health Organization child growth standards for age (5-19 years) using BMI in kg/m$^2$ (World Health Organization, 2007).

156 participants aged 7-12 years (85 males, mean age of 8.7 years (SD±1.5)) were recruited; 46% of participants participated at the Illawarra Health and Medical Research Institute at the University of Wollongong (29% general public, 17% the University of Wollongong's school holiday camp), and the remaining 54% of participants were recruited from five after-school centres across the Illawarra region. The SEIFA Index of Disadvantage for Wollongong City and Shellharbour City (Australian Bureau of Statistics, 2016) indicated participants were from low (46%) and medium (55%) socio-economic areas,

using postcode of residence, that was representative of the average population in the recruitment locale (Australian Bureau of Statistics, 2016).

**Table 6.3 Children's attitudes, snack choices, energy-intake, awareness and game enjoyment by condition group in a study examining the impact of advertising on children's attitudes, choices and consumption**

| | **Control (n=41)** | **Banner (n=38)** | **Advergame (n=38)** | **Rewarded Video Advertisement (n=39)** | **All conditions (n=156)** |
|---|---|---|---|---|---|
| **Pre- and Post-Game Attitude, median[a]** | | | | | |
| *Pre-Game 'Fun'* | 4/5 | 4/5 | 4/5 | 4/5 | 4/5 |
| *Post-Game 'Fun'* | 4/5 | 4/5 | 4/5 | 4/5 | 4/5 |
| *Pre-Game 'Taste'* | 4/5 | 4/5 | 3/5 | 4/5 | 4/5 |
| *Post-Game 'Taste'* | 4/5 | 4/5 | 4/5 | 5/5 | 4/5 |
| **Snack Choices, n (%)** | | | | | |
| *Grapes* | 14 (34.1%) | 10 (26.3%) | 4 (10.5%) | 9 (23.1%) | 37 (23.7%) |
| *Supermarket Brand* | 10 (24.4%) | 3 (7.9%) | 6 (15.8%) | 1 (2.6%) | 20 (12.8%) |
| *Squashies* | 9 (22%) | 8 (21.1%) | 11 (28.9%) | 4 (10.3%) | 32 (20.5%) |
| *Rowntree's Randoms (test brand)* | 8 (19.5%) | 17 (44.7%) | 17 (44.7%) | 25 (64.1%) | 67 (42%) |
| **Amount Consumed (grams), mean±SD** | 55.4±31.5 | 49.1±32.8 | 50.3±29.2 | 54.1±31.1 | 52±31 |

| | | | | | |
|---|---|---|---|---|---|
| **Energy Intake (kcals), mean±SD** | 127±108.2 | 120±101.8 | 153±97.1 | 148±109.7 | 137±104 |
| **Self-reported Awareness of Advertising, n (%)** | | | | | |
| *Aware* | 1 (2.4%) | 12 (31.6%) | 23 (60.5%) | 31 (79.5%) | 67 (43%) |
| *Not Aware* | 40 (97.6%) | 26 (68.4%) | 15 (39.5%) | 8 (20.5%) | 89 (57%) |
| **Self-reported Enjoyment of the Game, median[b]** | | | | | |
| *Enjoyment Rating /5* | 4/5 | 4/5 | 4/5 | 4/5 | 4/5 |

[a] Two 5-point Likert Scales – measured pre- and post-game attitude to test brand by perceived 'Fun' (using 'Boring' (1) and 'Fun'(5) as scale anchors) and perceived tastiness (using 'Yucky' (1) or 'Yummy' (5) as scale anchors).

[b] 5-point Likert Scale – measured enjoyment of the game by asking children 'How much did you enjoy playing the game?' (1= least enjoyed, 5 = most enjoyed).

*6.2.4.2 Attitudes*

The perceptions of the test brand as appetitive ('tasty' - indicated by 'Yucky or Yummy') and fun (indicated by 'Fun or Boring') are displayed in Table 6.3. These ratings were tested by two Kruskal-Wallis tests that showed that across groups there were no significant differences between pre- and post-game ratings of taste $\chi^2$ (3), = 4.42, p = 0.21 or fun, $\chi^2$ (3), = 7.42, $p$ = 0.06.

*6.2.4.3 Snack choice*

Using Chi-square tests, age and BMI were not associated with snack choice. Table 6.3 lists the snack choices made in each condition and indicates the test brand was chosen more frequently within the conditions exposed to the test

brand advertising compared with the control condition. Chi-square indicated that only one condition significantly influenced children's snack choice; children in the Rewarded Video Advertising condition were significantly more likely to choose the test brand, Rowntree's Randoms©, $\chi(9), = 25.97, p < 0.002$.

*6.2.4.4 Consumption*

Measures of consumption included any snack chosen and consumed by the children. Overall, children ate an average of 52±31 grams and 137±104 kcal (Table 6.3). Consumption was tested by a one-way ANOVA that indicated no significant differences across condition groups for amount consumed (grams) ($F(3,155) = 0.351, p = 0.789$) or energy consumed (kcals) ($F(3,155) = 0.861, p = 0.463$).

*6.2.4.5 Awareness of advertising*

Participants were most aware of the advertising when this was embedded in the game interface (rewarded video advertising condition 80% and advergame condition 60%) whereas only 31% of participants in the banner advertisement condition were aware of the advertising (Table 6.3). Chi-square indicated that children did not significantly recall advertising in the banner advertisement condition or the advergame; children were only significantly aware of advertising in the Rewarded Video Advertising condition $\chi(3) = 55.50, p < 0.001$.

*6.2.4.6 Enjoyment of the game*

The game was given a median rating of 4 (out of five) across all conditions (Table 6.3). Enjoyment of the game was tested by Kruskal-Wallis that indicated

no significant differences between condition and enjoyment of the game $\chi^2(3)$, = 1.42, $p = 0.69$.

### 6.2.5 Discussion

This study explored the influence of persuasive advertising techniques and placement within game designs that are commonly used in online games to promote food and beverages. The findings highlighted that persuasive and modern techniques, specifically those that overtly incorporate advertising into the game experience such as rewarded video advertising strategies, directly influence children to choose unhealthy advertised foods immediately after acute online game exposure. Comparatively, in the absence of this marketing, the healthy snack was selected by a substantial minority of children.

It was anticipated that a positive association towards the brand would be found in the conditions that incorporated an advertisement for the test brand, but contrary to the hypothesis, there were no significant differences across conditions in attitude towards the test brand.

Rewarded video advertising was significantly associated with the children's choice of the test brand. This supported the hypothesis that children who were exposed to the game with the test brand would be more likely to choose it. This technique directly related the interaction with the brand to success in the game and offered a particularly engaging advertising experience as it focused the participants' attention directly on the brand for a 30-second period. The content of the advertisement was rich in additional marketing techniques, such as

humor, known to be commonly used in marketing to children (Jenkin et al., 2014) which may have increased the influential power of the strategy.

Children were only significantly aware of the test brand advertising in the rewarded video advertisement condition. This could be for several reasons: it was the most overt technique; mid-roll advertising has been previously acclaimed as the optimal position for an advertisement (versus a pre- or post-roll advertisement) for brand recognition (Li and Lo, 2015) ; and dual-modality of audio-visual information is known to enhance children's product recall (Macklin, 1994). The Food Marketing Defense Model suggests the awareness of advertising is a significant component in providing a defense to mute the effects of advertising (Harris, 2009). However, children chose the test brand significantly more in the condition that they were significantly aware of the presence of advertising. This finding reflects the mechanisms underlying a Hierarchy of Effects model, that posits awareness and preferences are critical precedents to making a purchase or consumption that may lead to individual-level weight outcomes (Kelly et al., 2015a).

Despite the widespread use of banner advertisements on children's websites (Potvin Kent and Pauzé, 2018, Ustjanauskas et al., 2014), this advertising technique did not significantly influence children's food behaviors in this study. The advertisement was positioned at the bottom center of the game, in the peripheral field of vision. Proponents of banner advertising claim that players who are focusing on a game require the target stimuli to be outside of that focus so that the awareness is developed in a low state of cognitive processing

(Shapiro et al., 1999, Yeu et al., 2013). However, banner advertisements have been found to be ineffective when the player recognizes them as irrelevant content, and therefore actively avoids them (Yeu et al., 2013). A majority of participants claimed to have not noticed any branding or marketing of products in this condition and therefore the participants may have been ignoring the advertisement that they thought to be immaterial or they may have not cognitively processed its presence.

In addition, a significant proportion of the participants were not aware of advertising in the advergame condition. This is consistent with previous research that shows children have difficulty in identifying advertising within advergames (Vanwesenbeeck et al., 2016).The Food Marketing Defense Model requires children must actively recognize marketing content to activate their cognitive defenses that assist them to resist the effects of exposure (Harris, 2009). This model contents children would be unable to defend themselves in instances such as this embedded advertising where the advertising is not obvious.

In contrast with previous studies (Folkvord et al., 2013a, Norman et al., 2018), children's energy intake of their chosen snack was not significantly influenced by exposure to the test brand. The children were provided with 100g of food and on average consumed half the amount provided. Whilst the ten minute eating time was not disclosed to the participants, and they had all stopped eating before the ten minutes were finished, there is potential that the restriction on timing may have influenced their intake, as other studies who have found

significant intake results had no limit on the eating periods (Boyland et al., 2007). This exposure duration may have only been sufficient to influence awareness and choice which are known to be the initial factors within the Hierarchy of Effects Model (Kelly et al., 2015a).

*Study strengths and limitations*

The main strength of this study, that has not been common in other studies, was utilizing an unfamiliar test brand rather than local or globally popular products. This facilitated the exploration of the consumer journey and response to exposure in the absence of prior awareness, attitudes or associations with the product. Secondly, because the game was professionally designed and the marketing collateral was genuine, the content and vehicles of exposure that participants experienced were reflective of real-world interactions with online gaming and thus the findings contribute to a present-day understanding of food marketing within new media.

A limitation of this study is that it only investigated the short-term impacts of acute exposure to the food advertising techniques. As a result, this study cannot account for what children may have consumed after leaving the study. For example, they may have been inclined to eat healthier after eating the confectionery as their snack. However, due to recent research that has explored the impacts on energy intake post exposure at later occasions, it can be assumed that children would not have compensated for a less healthful or higher energy intake after exposure (Norman et al., 2018).

*Conclusion*

This research contributes new evidence that demonstrates the persuasive impacts of food marketing exposure on children's food behaviors through the medium of online gaming. It highlights that it is not simply exposure to a brand that influences children's brand awareness, attitudes and choices, but also how branded messages are delivered in highly sophisticated advertising techniques. Specifically, children were not influenced by banner advertising or advergames, but by a technique that rewarded the player for watching the advertisement by unlocking a lucrative level to facilitate game play (rewarded video advertising). In an era of increasing digital and mobile game use (Ofcom, 2018), this study indicates that an awareness of advertising is insufficient to protect children and they remain vulnerable to the effects of the advertisements. Moreover, rewarded video advertising has not been investigated before in academic research on children's food behaviors and findings suggest that it should be recognized as a high priority for effective marketing regulation interventions.

## 6.3 Chapter summary

This chapter presented the findings from Study Three. This study addressed the lack of evidence available on the impact of contemporary advertising techniques used within online games. A randomised controlled trial was conducted to investigate how different advertising techniques promoting an unfamiliar confectionary brand influenced children's food/brand attitudes, preferences and consumption. The advertising techniques included banner advertising, an advergame and rewarded video advertising. Rewarded video advertising has not

been critically evaluated before in academic research.

The study found that children who were exposed to the rewarded video advertising condition chose the test brand significantly more than children in the other three conditions. The children were also only significantly aware of advertising in this condition, whereas they were unaware of advertising in the banner and advergame conditions (and were uninfluenced by these techniques). Based on the literature it could have been assumed that the technique that involved covert advertising (advergame condition) may have been the most influential on children. However, this study showed that children were influenced when they were most aware of the advertising. Consumption was not influenced by condition. These findings highlight the persuasive impact of advertising techniques used in games and demonstrate it is not simply exposure that is influential to children, it is how the exposures are delivered using sophisticated techniques. This study indicates that rewarded video advertising must be a high priority area for regulations to reduce the impact of unhealthy food marketing on children.

The following chapter presents the discussion, which compiles the major findings of the systematic review and the three research studies, proposing their relevance within the evidence base for informing regulation. It summarises the current marketing landscape and its impact on children's health. Opportunities for further research are discussed.

# 7.0 CHAPTER SEVEN - DISCUSSION

## 7.1 Preface

This chapter provides a comprehensive narrative of the primary research findings from the three studies and systematic review that constitute this thesis. The programme of work is addressed in terms of the importance of its findings and its real-world implications on regulatory interventions. Finally, this chapter provides a discussion regarding recommendations for policy makers and identifies potential opportunities for future research.

## 7.2 Introduction

### 7.2.1 Relevance of conducting this research

The primary aim of this thesis was to investigate the impact of unhealthy food and beverage marketing on children's implicit and explicit brand attitudes and preferences, and most importantly by doing so, provide new evidence to support the restriction of food marketing to children.

This research addressed the significant gaps in critical areas of enquiry on the influence of marketing on children's (aged 0-18 years) attitudes, preferences and consumption. Exploration of the existing evidence in the literature identified little or non-existent research on the impacts of many contemporary marketing techniques. Very few studies (2 out of 71) had used qualitative methodologies and few had measured children's implicit responses to food marketing using physiological measures (2 out of 71). Moreover, whilst there were 13 studies that explored food marketing in online games, none of these (0 out of 71) had investigated the influence of advertising techniques other than advergames. This thesis addressed these important gaps in the research.

### 7.2.2 Key findings

A combination of three diverse research studies (qualitative and quantitative) facilitated a broad-reaching investigation and critically addressed the influence of marketing on children's explicit and implicit processing. The findings provide significant evidence of food marketing's influence and highlight children are greatly 'over branded and unprotected' (Hickey, 2018). In particular, this thesis contributes new evidence to answer three core research questions*:* i) *what are the explicit associations and attitudes that children have to branded food products? ii) how do children's attitudes to their favourite branded food products manifest physiologically? and iii) how do advertising techniques used to promote a unfamiliar food brand within a gaming context influence children's attitudes, preference and consumption?*

*Specifically, new evidence from this study identifies:*

- Children are very responsive to marketing techniques commonly used to promote food and beverage products, in particular, the use of characters, place of exposure, fun, self-identity and branded jargon (Study One).
- Children are significantly more physiologically aroused by images of their favourite food and beverage products in its branded packaging, than images of their favourite food and beverage products unpackaged. This is despite previous research that unpackaged products are considered more accessible and appetitive (Study Two).
- Children's physiological arousal to images of their favourite food and beverage products in their branded packaging does not significantly differ from children's arousal to images of their family and friends

(Study Two).

- Children's attitudes and preferences for an unfamiliar confectionary product are significantly influenced by advertising techniques used within online games, advergames and particularly rewarded video advertising (i.e. an advertisement that is watched mid-game to unlock another level in the game) (Study Three).

## 7.3 Implications of the research for policy change

The findings of this research have significant implications for policy as they provide new evidence on the impact of food marketing on children's explicit and implicit brand attitudes and preferences. The findings demonstrate food marketing is powerful, children are vulnerable and the restriction of food marketing is required to protect children.

### 7.3.1 Removing the responsibility off children and parents

A fundamental issue in confronting the obesity epidemic, is its framing as a causal model that largely places blame on individuals (Ralston et al., 2018). The dominant perspective of the government, industry (Australian Association of National Advertisers, 2018, Australian Food and Grocery Council, 2014a) and a society with a stigmatisation toward overweight children (Schwartz and Puhl, 2003), is that treatment and prevention of childhood obesity is in part the individual's and perhaps most critically, their parents' responsibility. This approach disregards complex factors outside individual and parental control, including environmental influences (Vadenbroeck, 2007) such as food

marketing (Ralston et al., 2018). Whilst parents may have a more developed understanding of food marketing (Rozendaal, 2010), food marketing undermines healthy eating messages from parents (Obesity Policy Coalition, 2018), who remain unable to substantially alleviate the effects of marketing on children. Particularly with the rise of new media, parental restriction is a much more difficult task, as parents have limited understandings of the sophisticated and highly engaging techniques used to market unhealthy foods online (Mehta et al., 2014). Conversely to parents, food companies have an extensive knowledge of children's activities online and use these data to target children (Mehta et al., 2014), making them an extremely vulnerable cohort.

The findings reported in this thesis demonstrate why the responsibility for protecting children from food marketing must be given to government. The research found (reported in Chapter Six) that children are not prompted to activate cognitive defences or use persuasion knowledge to resist the effects of advertising within online games (Van Reijmersdal, 2012). Children in this study were most influenced by (and aware of) the rewarded video advertisement condition. The Food Marketing Defence Model proposes that awareness of advertising is a necessary first step for individuals to effectively resist food marketing stimuli (Harris, 2009). Others believe there are scarce empirical grounds for the assumption children are able to make practical and informed assessments of the potential effects of advertising on their behaviours (Livingstone and Helsper, 2006). Despite the ubiquitous evidence children are influenced by food marketing (Cairns et al., 2013), Australian children do not perceive media advertisements as strong influences on their eating behaviours

and attitudes (Williams, 2011). This study provides evidence to support children's vulnerabilities to such advertising.

Government regulation is the most practical approach to restrict the delivery of the food marketing, as the child may be unable or unwilling to take action. The authors of the Food Marketing Defence Model recognise food industry practices exploit social development processes. They identify children may be aware of the marketing stimuli, understand their persuasive intents and possess the ability to defend against them, however their motivation to conform to the messages may be stronger than their desire to resist (Harris, 2009). For example, if the marketing contains messages contradictory to advice from parents, this may accentuate its appeal (Harris, 2009).

### 7.3.2 Current restrictions ineffective

The novel use of explicit child-centered, qualitative methodology in this thesis focused on the voice of the child, and revealed rich data from the targeted children who are experts on their own lives (Langsted, 1994). Listening to children's views is useful for policy makers for two key reasons. Firstly, the apparent awareness and response to marketing techniques indicated the current measures to restrict children aged 8-12 years are not effective. The results reported in Chapters Four and Five demonstrate children develop connections to branded food and beverage products. Children were able to identify their five most favourite brands as stimuli for the study, highlight appealing marketing techniques that they engage with (Chapter Four) and exhibit an implicit arousal response to them (Chapter Five). This suggests brands in the current marketing

environment have been successful at creating positive associations with children, and potentially worse, developing relationships with them. Furthermore, 140 out of the 260 images children claimed to be their most favourite were brands owned by signatories to the food industry codes of practice for responsible marketing to children, which strongly suggests voluntary commitments are ineffective as children are clearly exposed to brands that pledge to not target child audiences. This is important to note, as it has been advised restrictions should not solely focus on media overtly targeted at children, but should also focus on media to which children may be exposed (Tatlow-Golden et al., 2017).

### 7.3.3 New evidence to demonstrate the link between food marketing and obesity

This thesis contributes new evidence and a practical body of information for policy makers to identify appealing marketing techniques that should be the foci of regulation. The policy inertia and stymied efforts to address obesity in Australia (Coalition on Food Advertising to Children, 2007) is in part a consequence of the Australian Communications and Media Authority (ACMA) ruling of an ostensible lack of evidence directly linking food marketing to childhood obesity (Australian Communications and Media Authority, 2009b). The review that informed the decision to reject greater restrictions on food marketing contained valid submissions evidenced by convincing research demonstrating a strong link between food marketing and childhood obesity. However, the ACMA arbitrated 'there is currently no consensus in the research that the ACMA is aware of as to whether the association [between food marketing and childhood obesity] is anything more than ... "modest" (Australian

Communications and Media Authority, 2009b). This review is now a decade old (Australian Communications and Media Authority, 2009b), and there is a myriad of new evidence further substantiating food marketing has significant impacts on children. This has been acknowledged by global health authorities, including the World Health Organization, who have classified unhealthy food marketing as a global health priority (World Health Organization, 2018a) and a leading influencer of NCDs (World Health Organization, 2017).

The World Health Organization advises children require protection from targeted food marketing, under the United Nations Convention on the Rights of The Child (United Nations General Assembly, 1989), and recommends governments should define "marketing directed at children" (Tatlow-Golden, 2016). The design of policy specifications requires the definition of advertising techniques with child appeal rather than simply what may be considered 'child-friendly' (Government of Canada, 2018).

Policy makers can use the findings from this research, alongside the current evidence base, to support development and enforcement of protections to children. In particular, it is important to draw policymakers' attention to the following areas for regulation. The techniques that target explicit processing are more easily identified and hence easier to restrict. Explicitly asking children to identify the elements of branding they found most appealing (Study One) provides policy makers with precise and detailed aspects of marketing to address. For example, the themes identified by children in this study, such as the use of characters to market products, and platforms that effectively advertise

to children, should be extracted to inform regulations to restrict appealing content to children.

The findings provide evidence of the impact of unhealthy food marketing in digital media. Such evidence is necessary to underpin effective policy (Tatlow-Golden et al., 2017). Global policies to address marketing in new media lag behind those designed to address traditional broadcast media (Tatlow-Golden et al., 2017). Studies Two and Three explored implicit processing in response to marketing exposure and provided new evidence marketing influences children's unconscious and automatic responses. Regulating the power of marketing is of significant importance, as content analyses studies indicate the current environment is rife in marketing techniques that aim to influence implicit memory (Folta et al., 2006). Study Three explored the impact of food marketing on implicit processing by advertising an unfamiliar confectionary brand in a unique game setting and demonstrated the significant strength of rewarded video advertising and advergames. The banner advertising condition did not influence behaviour. This highlights the importance of method of delivery. New media uses an increasingly sophisticated set of techniques to deliver advertising messages (Meyer et al., 2018) and it is vital that research investigates the power of these techniques in order to protect children and develop effective regulations.

## 7.4 Strengths and limitations

A key strength of this research was the systematic review that allowed the identification of current gaps in knowledge. The review was prospectively

registered on PROSPERO, adhered to the PRISMA statement and was conducted using a pre-determined search strategy applied to five databases to ensure the search was comprehensive. This review provided a contemporary account of the influence of food marketing on children's attitudes, preferences and consumption up to September 2018. The most recent review on these proximate outcomes of food marketing exposure had been published in 2013 which included literature up to 2008 (Cairns et al., 2013), thus there was nearly a decade of new research to evaluate. The gaps in knowledge recorded in this review highlights the important addition of the findings in this thesis to the evidence base.

This thesis acknowledged the importance of studying the influence of food marketing exposure from both explicit and implicit angles and this facilitated the generation of a rich body of new evidence. The studies included in this thesis all address significant gaps in the research and provide new evidence to further illuminate the influence of the food marketing environment. The implementation of child-centered research contributed to our understanding of what children actually think, allowed children to be listened to as research participants, and created discussion around the most relevant (child-developed) stimuli. Other studies in this field have not previously used child-developed stimuli. Thus this study provides new evidence into children's real attitudes, associations and preferences. Another strength of this research was the use of a physiological measure to determine the implicit impact of branding. The use of electrodermal activity in this way was novel and effective in identifying an implicit response by children with their favourite brands. Finally, this thesis

also provided new key evidence into the advertising strategies used in online gaming. Rewarded video advertising has not been critically evaluated before in this field. The results indicated it was an important technique to explore as it was very influential on children.

All research has limitations and the studies comprising this thesis are no exception. Some of the limitations have been reported in earlier designated chapters. Chapter Four reported a skew in male participants in the study, which was not accounted for in the recruitment process as differences between sexes were not a planned measurement and therefore equal numbers were not a priority or concern. This has potentially resulted in a slightly biased sample towards male children's views and opinions.

Secondly, the execution of the stimuli acquisition in Study Two meant the children were familiar with the images they provided themselves. This may have influenced the arousal levels recorded, although this is not to infer why the arousal levels were higher, as familiarity could have also influenced the results by a decrease in arousal compared to novel stimuli. Future research could continue to use participant-selected stimuli but request it in a list form so the images would be novel. As an alternative to images, the research could present stimuli physically so the stimuli are immediate and tangible.

Study Three only sought to measure acute exposure, therefore it cannot speculate on the potential impacts of long term exposure to the techniques used in games to promote food to children. It also did not detect a significant

influence of food marketing on energy intake as television studies have done before, though this may have been because in these previous studies participants had been given a range of food and the food brands had been familiar (Halford et al., 2008b, Halford et al., 2004a).

## 7.5 Recommendations for future research

Both the strengths and limitations of the studies inspire ideas for future research. Future research should continue on this same trajectory to continue to use a variety of approaches to measure the broad impacts of food marketing.

Research should seek to involve more qualitative methodologies that give a stronger voice to the children, to gain a rich context about the food marketing environment in which children live. For example, qualitative methodology could explore how children interact with their peers about food brands – a dynamic that would be much more difficult to measure quantitatively. This is important as peers and friends play critical roles in the formation of children's attitudes and behaviours, and are perceived as important role models (Houldcroft et al., 2014) from childhood into preadolescence (Rubin et al., 2008). In particular, peers have a strong social influence on the evaluation of foods (Robinson and Higgs, 2012) and are likely to exert an influence on children's eating behaviours (DeCosta et al., 2017). Thus, it would be beneficial to explore how this dynamic operates alongside powerful food marketing.

Study Three in Chapter Five reported on the success of identifying an implicit response through electrodermal activity, a valuable area for further work. This

study focused on the response to branded versus unpackaged food. There is potential for many other routes of enquiry to gain greater understanding of what children think. For example, replicating the study, with some alterations, to assess the intricacies of brand imagery. Monitoring electrodermal activity could tease apart the elements of the branded packaging to understand what elements were most arousing. More information on the appealing qualities of branded packaging would help to establish with greater accuracy which elements provoke people to choose to consume particular foods. Such information could be very useful to inform regulation.

Chapter Six addressed rewarded video advertising in online gaming. There are many contemporary marketing techniques proliferating across new media that require close examination. The systematic review revealed the evidence on the influences of food marketing using new media is very limited. Further research could measure the impact of other sophisticated techniques. For example, exploration of techniques recently identified in young children's apps, including pop-ups and in-app purchases (Meyer et al., 2018), and food marketing embedded within user-generated content (Potvin Kent et al., 2019). Children are presented with branded food content 0.14 times per minute when using social media apps, and paired with their usage, it is estimated children view food marketing 30 times a week on these platforms alone (Potvin Kent et al., 2019). As the techniques used and exposures are known, it is imperative to undertake research exploring the power of these techniques on children.

## 7.6 Conclusion

The environment is a significant influencer on health determinants (Swinburn et al., 2011) and the food marketing environment has been established by the World Health Organization as a global health priority (Swinburn and Egger, 2002, World Health Organization, 2010, World Health Organization, 2018a). Children's aptitude in digital communications, paired with their natural credulity, lack of cognitive defences and inexperience, makes them the most desirable demographic available to marketers (Garde, 2018). Childhood obesity undermines the physical, social and psychological well-being of children and is a known risk factor for adult obesity and non-communicable diseases (World Health Organization, 2016). Thus there is an urgent need for action to improve the health of the present and next generations of children (World Health Organization, 2016).

The studies comprising this thesis provide significant evidence for the case to restrict unhealthy food marketing to children. Importantly this body of research provides new evidence that addresses research gaps and contributes to a comprehensive body of knowledge of the influence of marketing. This new evidence shows food marketing strongly influences children's explicit and implicit attitudes and preferences – known risk factors for childhood obesity (Kelly et al., 2015a). This was regardless of whether the research stimuli were children's favourite food brands or a food brand they had never seen before. This reveals both the immediate and accumulative effects of food marketing that lead children to form strong connections with their favourite brands. A persuasive impact over children's attitudes and preferences should be highly

concerning to educators, parents and the government, as it is practically impossible for children themselves to make an independent and informed assessment of the potential effects of advertising on their behaviour (Livingstone and Helsper, 2006).

As major players, the Australian government must be held accountable for progress towards public health nutrition goals and actions (Mills, 2015, Yeatman, 2007). Policies can create environments to make healthy choices easier (Marteau et al., 2012) and if the next generation are to have better health outcomes, restrictions on the marketing of unhealthy food must be enforced (Obesity Policy Coalition, 2018, World Health Organization, 2016). This research indicates the most effective policy measures should account for, and restrict, both the covert and overt marketing techniques used by food brands. In doing so, they should aim to restrict those marketing techniques of appeal to children, regardless of whom the brands claim to be the audience of the branding or marketing campaigns. The appealing and influential techniques highlighted in this research should be the foci of regulation.

A policy brief has been developed to advocate for a healthier environment from the findings based on the current body of research and the existing literature.

## 3.7 Policy brief

**The need for stronger food marketing regulations:**
New research highlights current restrictions on marketing of unhealthy food and drink to children does not work

**R. Smith, September 2019**

New evidence from Australia strongly suggests that current voluntary legislation is ineffective and highlights the need for regulatory reform. 'The Responsible Children's Marketing Initiative (RCMI)' and 'the Australian Quick Service Restaurant Industry (QSRI) Initiative for Responsible Advertising and Marketing to Children' have been in place since 2009, but clearly children are being targeted by marketing tactics of manufacturers of foods high in fat, sugar and salt (HFSS), putting their current and future health at risk.

## Regulatory reform is urgently required

Recent research evidence identifies current marketing policy is failing to protect children and is not fulfilling its societal responsibility to reduce childhood obesity and promote health outcomes for children. This research shows that:

- Children are more physiologically aroused by their favourite food and drinks when it's in branded packaging than when the products are unpackaged ($p < 0.042$) [1].
- Children can form preferences for unknown food products within 4 minutes of playing an online game ($p < 0.002$) [2].
- Children are highly responsive to marketing techniques including: the use of characters, place of exposure, fun, self-identity and branded jargon [3].

[1] Smith R., Kelly, B., Yeatman, H., Johnstone, S., Baur, L, King, L, Boyland, E., Chapman, K., Hughes, C., & Bauman, A. (2019). Skin conductance responses indicate children are physiologically aroused by their favourite branded food and drink products. *International Journal of Environmental Research and Public Health, 16, 3014*.

[2] Smith R., Kelly, B., Yeatman, H., Moore, C., Baur, L, King, L, Boyland, E., Chapman, K., Hughes, C., & Bauman, A. (2019). Advertising placement in digital game design influences children's choices of advertised snacks: a randomized trial. *Journal of the Academy of Nutrition and Dietetics. (Accepted for Publication).*

[3] Smith R., Kelly, B., Yeatman, H., Baur, L, Thomas, S., King, L, Boyland, E., Chapman, K., Hughes, C., & Bauman, A. "Be like John Cena and eat this today" Children are highly engaged with the marketing techniques used to promote unhealthy foods. *Australian & New Zealand Journal of Public Health (Under Review.)*

## Recommended policy actions

The current regulatory approaches to marketing and advertising of food and drinks high in fat, salt and sugar (HFSS) across all media needs review. The review should include:

- All HFSS marketing and advertising during TV shows directed at children, TV shows directed at families (talent shows, broadcasted sport, etc), children's social media accounts, and websites directed at children and families.
- The use of characters (brand equity characters and licensed characters) on the packaging of HFSS products.
- The marketing or advertising of HFSS products in children's online games between the hours of 6am-10pm.

* These actions refer to children using the United Nations definition - an individual under the age of 18

** The times suggested are referring to the assumed waking hours of most children

## Executive summary

This study involved a team of international researchers funded by the Australian Research Council with Cancer Council NSW as the Linkage Partner. They reviewed current global evidence of marketing of unhealthy foods directed at children and undertook three empirical studies with children aged 7-12 years in the NSW region of Australia. The research demonstrated the strong emotional connections children form with brands and identified how marketing techniques negatively influence children's food choices and preferences.

### The new research: approaches, methods and findings

*"Be like John Cena and eat this today" Children are highly engaged with the marketing techniques used to promote unhealthy foods.*

**Aim:** Investigated children's explicit associations with and attitudes about branded food products through the implementation of child-centred qualitative methodology.

**Method:** Two child-centred activities and the inclusion of participant-developed stimuli derived through a visual method called 'Auto driving.' This was the first study to use child-developed stimuli, and therefore gained a richer and valid understanding of the brands that children most respond, like, and relate to.

**Findings:**

**-** *The food marketing techniques with most appeal to children were identified*: These included the use of characters, place of exposure, fun, self-identity and branded jargon. These findings serve as a guide to identifying which marketing

techniques should be the foci of food marketing regulations.

- *Children's favourite food brands were identified by the children themselves.*

Child-developed discussion stimuli provided new insights into the power of marketing techniques to influence food preferences of child consumers, such as those brands of which children are most favourable to.

*Skin conductance responses indicate children are physiologically aroused by their favourite branded food and drink products.*

**Aim:** Identify children's implicit (physiological) responses to their favourite branded products.

**Method:** For the first time this study explored children's emotional connections/physiological reactions to their favourite food brands by measuring electrodermal activity (the body's skin response to stimuli). The study measured children's electrodermal activity as they watched images of their favourite (self-selected) branded food and drink, the same products unpackaged, images of their friends and family, and filler images.

**Findings:**

- *Food packaging is influential:*

Children were more physiologically aroused to images of their favourite food and drink in its branded packaging versus the unpackaged counterparts. Unpackaged food and drink has been previously shown to be more 'readily available' and appetising than packaged foods, so this finding indicates that the liking or relationship with these branded foods overrides the previously shown

automatic response to unpackaged food and drink and is likely the result of a learned behaviour.

- *Children form strong brand connections:*

The reactions children had to their favourite branded food and drink products were very similar to their reactions to the images of their friends and family, indicating children had developed strong connections to these brands.

*Advertising placement in digital game design influences children's choices of advertised snacks: a randomized trial.*

**Aim:** Explore the influence of contemporary advertising techniques to promote unhealthy foods

**Method:** The contemporary advertising techniques used in online games was replicated. These techniques included a banner advertisement (a display advertisement underneath the game), an advergame (food and logos used as game pieces) and rewarded video advertising (players were rewarded with a more exciting level on the game after watching a video advert for the food). Rewarded video advertising is growing in popularity and had not been studied previously in this context. An unfamiliar food brand was used as the stimuli, as recommended by previous research and children played the game for 4 minutes. This was followed by attitude questionnaires and the opportunity for children to choose one snack to eat from a selection which included the advertised snack.

**Findings:**

*-Rewarded video advertising significantly influences children to choose the advertised foods*.

Children who played the game with the rewarded video advertising technique were significantly more likely to choose the advertised food as their snack than the children in the other conditions ($p < 0.002$).

- *Children do not have the cognitive defences to resist the persuasive marketing messages.*

The children were significantly more aware of video advertising than in the other conditions. Thus, even if children are aware of advertising, they cannot rely on cognitive defences to help them rationalise the persuasive message.

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# APPENDICES

# Appendix A: Ethical Approval (Studies One and Two)

UNIVERSITY
OF WOLLONGONG
AUSTRALIA

APPROVAL LETTER
**In reply please quote: HE16/233**
Further Information Phone: 4221 3386

10 August 2016
School of Health and Society
Early Start Research Institute
University of Wollongong

Dear Dr Kelly,

Thank you for your response dated 08/08/16 to the HREC review of the application detailed below. I am pleased to advise that the application has been approved.

| | |
|---|---|
| Ethics Number: | HE16/233 |
| Project Title: | Examining the potential impact of discretionary food and drink marketing on children's brand associations and attachments, and the mechanisms underpinning this relationship at the implicit and explicit levels |
| Researchers: | Dr Bridget Kelly, Professor Heather Yeatman, Miss Rachel Smith, Professor Louise Baur, Associate Professor Samantha Thomas, Professor Adrian Bauman, Associate Professor Lesley King, Dr Emma Boyland, Ms Kathy Chapman, Ms Clare Hughes, Associate Professor Stuart Johnstone |
| Documents Approved: | Initial Application (31/05/16)<br>Responses dated 25/07/16 and 08/08/16<br>Parent Information Letter, Version 6<br>Parental Consent Form, Version 2<br>Transcript of children's discussion, Version 1<br>Focus Group Questions<br>Recruitment Poster<br>Photography Guide<br>Invitation Email |
| Approval Date: | 9th August 2016 |
| Expiry Date: | 8th August 2017 |

The HREC has reviewed the research proposal for compliance with the *National Statement* and approval of this project is conditional upon your continuing compliance with this document.

Approval by the HREC is for a twelve month period. Further extension will be considered on receipt of a progress report prior to expiry date. Continuing approval requires:

Ethics Unit, Research Services Office
University of Wollongong NSW 2522 Australia
Telephone (02) 4221 3386
Email: rso-ethics@uow.edu.au Web: www.uow.edu.au

- The submission of a progress report annually and on completion of your project. The progress report template is available at http://www.uow.edu.au/research/ethics/human/index.html. This report must be completed, signed by the researchers and the appropriate Head of Unit, and returned to the Research Services Office prior to the expiry date.
- Approval by the HREC of any proposed changes to the protocol including changes to investigators involved
- Immediate report of serious or unexpected adverse effects on participants
- Immediate report of unforeseen events that might affect continued ethical acceptability of the project.

If you have any queries regarding the HREC review process, please contact the Ethics Unit on phone 4221 3386 or email rso-ethics@uow.edu.au.

Yours sincerely,

Associate Professor Melanie Randle
**Chair, UOW & ISLHD Social Sciences**
**Human Research Ethics Committee**

*The University of Wollongong & Illawarra Shoalhaven Local Health District Social Science HREC is constituted and functions in accordance with the NHMRC National Statement on Ethical Conduct in Human Research.*

**Appendix B: Parent Information Letter (Study One and Two)**


**PARENT INFORMATION LETTER**
**Research Project**

**Title:** Exploring children's attitudes towards their favourite foods and drinks

This is an invitation to participate in public health research that aims to contribute towards evidence for policy changes within food marketing.

**(1) What is the study about?**

Food marketing influences the way that children perceive and think about food and drink brands. This study will explore children's attitudes to different foods and drinks that they like/dislike.

**(2) What does the study involve?**

The study has 2 phases - the child must take part in both phases:

**PHASE 1:**

PART 1 - The child will be asked to photograph and upload images of their favourite food and drink products to the researcher, using a guide provided. They will also provide some photos of their family and friends. This is because the study is comparing brand attachment to other entities that they have an attachment to. Parents and participants must ensure all of the people they supply images of are told of the purpose and agree to the images being used for research*.

*The photographs of the friends and family will be used as experimental tools in the galvanic skin response experiment. They will act as a guide when measuring each individual child's arousal response assuming that they will produce an intrinsically arousing response.

**PHASE 2:**

PART 1 – The child will come in for the study and will first view a series of images (including their own photographs). They will have their galvanic skin response measured, which is a non-invasive arousal measure that simply measures the sweat produced on their fingertips.

PART 2 – The child will also take part in a focus group, which will explore attitudes towards the food and drink products. For example, they will be

asked about their attitudes towards brands by questions such as *"Describe what type of person you think would eat/drink this?"* This will be recorded on an audio tape.

**(3) Where will the study take place?**
The study will take place in the Early Start Building (21) at the University of Wollongong (map will be supplied) - except the photography which will be in the child's own time.

**As a thank you for the child participating, they will receive $30 in ITunes vouchers.**

**(4) How much time will the study take?**
The children will be given a timeframe of 7 days to upload their photos. The skin response measure will take 10 minutes and the focus groups (in groups of 3) will take 30minutes.

**(5) Who can participate?**
Children aged 8 to 11 years are eligible to participate, as long as their parents have provided **written consent** (please see enclosed consent form) and the child themselves provide verbal consent at the time of the interview.

**(6) Can my child withdraw from the study?**
Participation in this study is completely voluntary – you are not under any obligation to participate and - if you do participate - you can withdraw at any time without affecting your relationship, or your child's relationship, with the University of Wollongong. You can also choose to withdraw your child's data from the experiment, which will then be erased.

**(7) Will anyone else know the results?**
All aspects of the study, including the results, will be strictly confidential and only the researchers will have access to information on participants. It cannot be guaranteed that children's responses in focus groups will be confidential, as they are participating with other children. A report of the study may be submitted for publication or presentation at a conference, but individual participants will not be identified by name.

In accordance with University procedure, the survey data will be securely kept for 5 years before being destroyed. Electronic data will be stored in password protected files and physical data will be stored in a locked filing cabinet in Building 21 at the University of Wollongong.

**(8) What are the benefits of the study?**
This study will contribute new information about the possible impacts of food marketing on children's food brand awareness, attitudes and food behaviours. Understanding the impact of this marketing is important for designing solutions to improve children's dietary intake and nutrition-related health outcomes.

**(9) Can I tell other people about the study?**
You may discuss your child's participation in this study with others as you wish.

**(10) What are the potential risks?**
This study poses no physical or emotional harm to children. Information from children will be de-identified following the skin response experiment and focus group. Whilst galvanic skin response is a physiological measure, it is not a risk, and does not cause any harm or discomfort. It measures sweat and is attached to the child via two soft pads on their index and middle fingers on one hand. We will be exposing children to pictures of unhealthy food brands (their own food/drink images and the other food/drink images in the focus group) and due to the far-reaching nature of food advertising, it is highly likely that children have seen these brands before.

It is very unlikely that a participant will become distressed. If participant distress did occur, it is likely to only entail shyness, or being overwhelmed by a confronting situation in a group of children and needing to express a view in the focus groups. If children did become distressed at any point within the study, they will be reminded that their participation is voluntary and they are not required to continue any further.

**(11) What if I require further information?**
If you would like to know more at any stage, please feel free to contact:

Rachel Smith (PhD Student)
Phone: 0481234745; Email: res544@uowmail.edu.au

Dr Bridget Kelly (Senior Lecturer)
Phone: (02) 4221 3893; Email: bkelly@uow.edu.au

Professor Heather Yeatman (Head of School of Health and Society)
Phone: (02) 42839900; Email: heather_yeatman@uowm.edu.au

**(12) What if I have a complaint or concerns?**
Any person with concerns or complaints about the conduct of this research study can contact the Ethics Officer, Research Services Office, University of Wollongong, NSW on 4221 3386 (telephone) or rso-ethics@uow.edu.au (email)

**(13) Who is carrying out the study?**
The study is being undertaken as part of a PhD at the University of Wollongong Early Start Research Institute, by Rachel Smith. It is being funded by an Australian Research Council Linkage Grant: LP140100120 and the Cancer Council NSW.

It is supervised and co-investigated by Dr Bridget Kelly and Professor

Heather Yeatman – School of Health & Society, UOW. Other Co-Investigators: Professor Louise Baur, Associate Professor Samantha Thomas, Professor Adrian Bauman, Associate Professor Lesley King, Dr Emma Boyland, Kathy Chapman, Clare Hughes and Associate Professor Stuart Johnstone.

## Appendix C: Parental Consent Form (Study One and Two)


**Parental Consent Form**

***1) For children aged 8-11years (parents please sign)***

I,.....[PRINT NAME], agree to permit my child ……..……[PRINT CHILD'S NAME], who is aged ..... years, to be a participant in the research project:

**Title:** Exploring children's attitudes towards their favourite food and drink brands.

In giving my consent I acknowledge that:

1. I have read the Parent Information Letter, which explains the aims and the nature of the study and the possible risks, and the statement has been explained to me to my satisfaction.

2. I understand that my child will be responsible for taking photographs of food and drink products and supply these, and photos of family/friends to the researcher.

3. I understand that my child will have their skin response measured and that this is a non-invasive method that will induce NO pain or discomfort.

4. I understand that my child will partake in a focus group that is recorded on an audiotape.

5. Before signing this Consent Form, I have been given the opportunity of asking any questions relating to any possible physical and mental harm my child might suffer as a result of participation and I have received satisfactory answers.

6. I understand that I can withdraw my child from the study at any time without prejudice to me or my child's relationship to the University of Wollongong.

7. I agree that research data gathered from the results of the study may be published provided that my child and I cannot be identified.

8. I understand that if I have any questions relating to my child's participation in this research, I may contact Bridget Kelly by telephone on 4221 3893.

9. I understand that if I wish to withdraw any information provided by myself or my child at a later date, I may contact Bridget Kelly.

10. I understand that if I have any complaints or concerns surrounding the conduct of the research I can contact the Ethics Officer, Research Services Office at the University of Wollongong via telephone on 4221 3386 or email via rso-ethics@uow.edu.au

11. I acknowledge receipt of a copy of this Consent Form and the Information Sheet.

I agree to obtain approval from all people appearing in the images before uploading them for research purposes. PLEASE INITIAL BOX ☐

**Signed:** .....

**Date:** .....

**Name:** .....

## Appendix D: Photography Guide for Branded Food and Drink Products (Study One and Two)

# Food/Drink Photography Guide

You have 7 days to please upload the following to your private Drobox file using your unique link in the email (**Ask your parents to help**):

* **5** different photographs of your favourite food/drink products!
* **5** headshots/zoomed-in photos of your family members and close friends!

**The food/drink photo requirements:**

⇒ Use a camera phone/digital camera

⇒ The photo can be of *any branded food or drink product you like* (e.g a cereal, a takeaway meal) but it must be in its original packaging (e.g box, wrapper, bottle, delivery packaging)

⇒ The location of the product can be in anywhere you are having it, it could also be a photo of the product on the shop shelf or on a poster if you are not buying it.

⇒ 1 product per photo— must include the whole food/drink in it and must be zoomed in so there is nothing else obvious in the background

⇒ You must have taken the food and drink photos yourself

Please do not take photos of your favourite homemade meals and remember to take photos of products you can buy in a shop or order takeaway from a restaurant. Try and think about what you'd like to eat/drink if you were given some pocket money!

You will be talking about your photos in the focus groups so please pick brands that you love and recognise.

Hope you have fun!

**Examples:**



## Appendix E: Photography Guide for Family/Friends Photographs (Study One and Two)

### Family/Friends Photo Guide

You have 7 days to please upload the following to your private Drobox file using your unique link in the email (**Ask your parents to help**):

- **5** different photographs of your favourite food/drink products!
- **5** headshots/zoomed-in photos of your family members and close friends!

*The family and friend photos that you provide will only be used in your own experiment and no one else will see them.*

*The family/friend images will be used as experimental prompts only in the galvanic skin response and only the food/drink images will be shown and discussed in the focus groups.*

*When selecting the photos, make sure you ask the person in the photo for permission to use it.*

**The family/friends photo requirements:**

⇒ Please crop the photo so it only includes your family member or friend.

⇒ Please make sure you send the photos to me with a parent helping you, so that they can see the photos you have chosen.

⇒ Please make sure that before you upload your images, you check that you have got permission from all of the people that feature in the photos.

⇒ In case of more than one participant from the same family, it does not matter if the family pictures are the same.

**Examples:**

## Appendix F: Scripts for Verbal Consent (Study One and Two)

### Script for Verbal Consent – Focus Groups (Study One)

*Will be recorded using 2 audio recorders. The moderator will ask the children to introduce their name at the start and say what they had to eat for breakfast (to establish voices for transcribing).*

Hi (insert child's name),
How are you going? You did an excellent job with the Galvanic Skin Device. Just to remind you, my name is Rachel and this is Zoe, and you can let either of us know if you'd like to stop at any time.
We are now going to do the second half of the study. We will have a bit of a chat about the great food and drink photographs that you've taken and do an easy group activity to get some of your ideas about what kind of food products you like. It will be fun and just take 30 mins. You will get a iTunes voucher at the end as a thank you from me.
Does that sound okay? [if no, thank you for time and end]
Thank you, that's great. If you want to stop just let me know and we can stop straight away. I'm going to record our chat so that I can listen to it later is that Ok?
[If no, do not record and make lots of notes]
So, we all have our name tags on and it's really important that the recorder can hear us so I'd like to you just say your name and what you had for breakfast this morning. We'll start with you [child name].

### Script for Verbal Consent – Galvanic Skin Response (Study Two)

Hi (insert child's name),
How are you going? My name is Rachel and I am a student here. Thank you for coming in today and sending in all those photos of your favourite foods and drinks. They are great pictures - I hope it was fun taking them! I've put your photos into a slideshow along with some other photos that are similar. You're the only one that is going to see most of these photos, including the photos of your friends and family.
I'm going to ask you to sit here in front of the laptop and watch two slideshows. They are about twelve minutes overall so please make sure you're comfy in the chair.
I want to show you what you'll be wearing on your fingers during the experiment. You don't need to remember this name, but it is called a Galvanic Skin Device and it just measures the sweat on your fingers! If you look at my hand here, it attaches to my fingers with Velcro, so it is very soft, and you also won't feel anything happening.
Would you like to have a look at it? I'm going to put some gel on your fingers too so it works the best it can! We will wash it off after. Do you have any questions about that?
[Answer any questions]
Does that all sound okay?
[If no, thank you for time and end]
Ok great. Let's put this on your fingers and if at any time you want to stop just let me know and we can stop straight away. How does it feel?
[Adjust straps to be looser or tighter if needs be]

Fantastic, are you ready to start?
[If no, thank you for time and end]

## Appendix G: Semi-structured Interview Prompts (Study One)

**Research question**

1. What are the explicit associations and attitudes that children have to branded food products, including to their own favourite products and a hypothetical product?

Guide for Interviews and Activities

*Will be recorded using 2 audio recorders. The moderator will ask the children to introduce their name at the start and say what they had to eat for breakfast (to establish voices for transcribing and break the ice) *see verbal consent script*.*

**Activity One – Group Cereal Design Activity**

*A blank cereal box will be printed out on A3 paper in on a table.*
"Okay, as a group I'm going to ask you to work together to see what you can come up with. You're gonna have a go at designing a cereal box that you think your friends and other children your age would notice in a shop. Have a little think to yourself first for a couple of seconds of how you think it could look and anything that would make it look really cool to children your age. Right, have a go now and help yourself to all of the colouring pens"
*Think about 3 of the 4Ps (product, place, promotion) when prompting children. Allow them to take the lead but use the following prompts below if they become stuck. If a child draws or suggests something, ask why they think it's a good idea.*
"What should the name be?"
"How will children know it's made for them?"
"Where would you advertise it so people see it and want to buy it?"

**Activity Two - Photos Activity/Favourite Branded Products**

*Each child will have their 5 photos in front of them*
"Okay guys, your photos look great! Have a look at your own photos and put them in order on the floor in front of you in order of your favourite to least favourite.
These are all very interesting photos."
**Moderator asks questions about the children's favourite photos, starting with one child at a time, and beginning with the top photo. Ask about what makes it their favourite product and their interactions with it. Follow up on responses (use prompts below if needed) – note taker will take pictures of the order**

***Directly to the individual***

“Why is that your favourite [food/drink]?”
“Do your friends know it’s your favourite?”
*Guess where they are – e.g. if in supermarket* “did you buy it when you took this photo?” “Do you usually buy this with your own money?”
“Tell me about when you first tried it”
“Have you ever seen it advertised anywhere?”
“Tell me about when you like to have it”
“How would you feel if they stopped selling [brand]?”

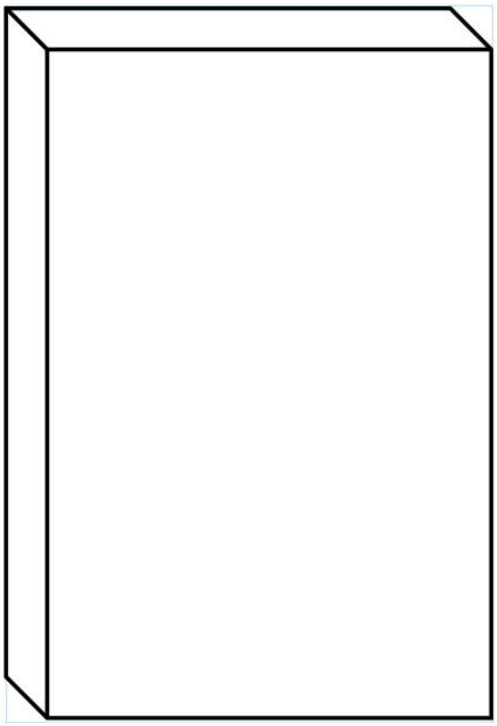
**Moderator opens up the questioning to the group. Follow up responses (use prompts below if needed)*

***Open up to the group***

“And what about the rest of you? Do you like [x brand]?”
“What can you tell me about [food/drink]?”
“Have you all had it before?”
“How did you all hear about it when you first tried it?”
“Describe what kind of person you think this product is for”

*Repeat with the next child’s photographs*

## Appendix H: Cereal Box Before and After Example (Study One)



## Appendix I: Ethical Approval (Study Three)

Dear Dr Gillott,

I am pleased to advise that the application detailed below has been **approved**.

| | |
|---|---|
| Ethics Number: | 2017/311 |
| Approval Date: | 08/08/2017 |
| Expiry Date: | 07/08/2018 |
| Project Title: | Exploring how children's food brand associations and food choice preferences are affected by exposures to food marketing within web-based advergames: a Public Health perspective |
| Researchers: | Kelly Gillott Bridget; Smith Rachel; Yeatman Heather; Bauman Adrian; Baur Louise; Boyland Emma; Chapman Kathy; Folkvord Frans; Hughes Clare; King Lesley; |
| Documents Approved: | Ethics Application Final Rachel Smith 29/06/2017<br>Response to Review Form 01/08/2017<br>Participant Information Sheet Peak Afterschool Care 01/08/2017<br>Participant Information Sheet Peak Vacation Care 01/08/2017<br>Participant Information Sheet Sports Camp 01/08/2017<br>Participant Information Sheet UOW 01/08/2017<br>Consent Form Version1 23/06/2017<br>Debriefing Information Version1 23/06/2017<br>Verbal Debriefing Version1 28/06/2017<br>Email to Peak Version1 19/05/2017<br>Peak Brief Version1 19/05/2017<br>Peak Confirmation Version1 15/06/2017<br>Peak Blurb Version1 25/06/2017<br>Email to Sports Camp Version1 26/04/2017<br>Sports Camp Confirmation Version1 05/05/2017<br>Email to Sports Camp Parents Version1 26/06/2017<br>Email to IHMRI Version1 26/04/2017<br>Email from IHMRI Version1 26/04/2017<br>Email to Schools Version1 23/06/2017<br>Media Advert UOW Version1 22/06/2017<br>Media Advert Peak Version1 22/06/2017<br>Media Advert Sports Camp Version1 22/06/2017<br>Flyer Sports Camp Version1 22/06/2017<br>Flyer Peak Version1 22/06/2017<br>Flyer UOW Version1 22/06/2017<br>VAS Scale Version1 23/06/2017<br>Brand Recognition and Attitudes Questionnaire Version1 28/06/2017<br>Game Version1 23/06/2017 |
| Sites: | |

| Site | Principal Investigator for Site |
|---|---|
| University of Wollongong | Rachel Smith |
| Peak Sports & Learning | Rachel Smith |

The HREC has reviewed the research proposal for compliance with the *National Statement on Ethical Conduct in Human Research* and approval of this project is conditional upon your continuing compliance with this document. Compliance is monitored through progress reports; the HREC may also undertake physical monitoring of research.

Approval is granted for a twelve month period; extension of this approval will be considered on receipt of a progress report **prior to the expiry date**. Extension of approval requires:

- The submission of an annual progress report and a final report on completion of your project.
- Approval by the HREC of any proposed changes to the protocol or investigators.
- Immediate report of serious or unexpected adverse effects on participants.
- Immediate report of unforeseen events that might affect the continued acceptability of the project.

If you have any queries regarding the HREC review process or your ongoing approval please contact the Ethics Unit on 4221 3386 or email rso-ethics@uow.edu.au.

Yours sincerely,

**Emma Barkus**

Dr Emma Barkus,
**Acting Chair, UOW & ISLHD Social Sciences Human Research Ethics Committee**

*The University of Wollongong and Illawarra and Shoalhaven Local Health District Social Sciences HREC is constituted and functions in accordance with the NHMRC National Statement on Ethical Conduct in Human Research.*

## Appendix J: ANZCTR Registration Confirmation (Study Three)

Dear Rachel Smith and Bridget Kelly,

Re: Exploring how children's food brand associations and food choice preferences are affected by exposures to food marketing within web-based games: a Public Health perspective

Thank you for submitting the above trial for inclusion in the Australian New Zealand Clinical Trials Registry (ANZCTR).

Your trial has now been successfully registered and allocated the ACTRN: ACTRN12617001313325

**Web address of your trial**: http://www.ANZCTR.org.au/ACTRN12617001313325.aspx
**Date submitted**: 8/09/2017 11:43:14 AM
**Date registered**: 13/09/2017 9:34:08 AM
**Registered by**: Rachel Smith
**Principal Investigator**: Bridget Kelly

If you have already obtained Ethics approval for your trial, please send a copy of at least one Ethics Committee approval letter to info@actr.org.au or by fax to (+61 2) 9565 1863, attention to ANZCTR.

**Note that updates should be made to the registration record as soon as any trial information changes or new information becomes available. Updates can be made at any time and the quality and accuracy of the information provided is the responsibility of the trial's primary sponsor or their representative (the registrant).** For instructions on how to update please see http://www.anzctr.org.au/Support/HowToUpdate.aspx.

Please also note that the original data lodged at the time of trial registration and the tracked history of any changes made as updates will remain publicly available on the ANZCTR website.

The ANZCTR is recognised as an ICMJE acceptable registry (http://www.icmje.org/faq.pdf) and a Primary Registry in the WHO registry network (http://www.who.int/ictrp/network/primary/en/index.html).

If you have any enquiries please send a message to info@actr.org.au or telephone +61 2 9562 5333.

Kind regards,
ANZCTR Staff
T: +61 2 9562 5333
F: +61 2 9565 1863
E: info@actr.org.au
W: www.ANZCTR.org.au

## Appendix K: Approval to Collaborate with Sports Camp (Study Three)

Hi Rachel,
Sorry for the late replay, slowly working my way through everything.
I can supply you with an email list of camp participants which you could contact for your study.
We are happy to work in with your study during July & September, we can talk finer deatisl at a time that is conveneinet to you.

Regards

**Lee Murray**
**Sport Programs Manager**
**UOW PULSE Ltd**
**Sports Hub Building 9**
**University of Wollongong NSW 2522 Australia**
**T +61 2 4221 5358 | F +61 2 4228 9233**
urac.com.au | Facebook | Twitter | Instagram

## Appendix L: Approval to Collaborate with Peak Sport and Learning (Study Three)

PEAK SPORTS & LEARNING
Fitness • Education • Fun

Dear Rachel,

I write to confirm that as a Director of Peak Sports and Learning, I give permission for your study to involve our Outside School Hours Centre's in your recruitment process. This permission includes but is not limited;

- You have permission to recruit children via our Centre's
- You are permitted to conduct the research on our sites (Working with Children check's for volunteers or paid employees must be given to us prior to your visits)
- Your access to our Centre's to conduct research is permitted during our opening hours of
    - Before School Care 7am – 9am
    - After School Care 3pm – 6pm
    - Vacation Care 7am – 6pm

We look forward to working with you on this project.

Grant Neill

Director

Peak Sports and Learning

**Peak Sports and Learning Pty Ltd**
**A:** Unit 3/106A Industrial Rd, Oak Flats NSW 2527 **P:** 1300 GO PEAK (1300 467 325) **@:** admin@peaksportslearning.com.au
**W:** www.peaksportslearning.com.au **ABN:** 86 162 512 487

Outside School Hours Care

**Appendix M: Parent Information Letter UOW (school holidays children both Sports Camp and non-Sports Camp) (Study Three)**

**Title: Exploring how children's food brand associations and food choice preferences are affected by exposures to food marketing within web-based advergames: a Public Health perspective**

This is an invitation to participate in public health research that aims to contribute towards evidence for policy changes within food marketing.

**(1) What is the study about?**

Children's diets may be influenced by frequent and repeated exposure to the promotion of unhealthy food choices. Young children live in a media-saturated environment in which screen time has become the predominant waking activity of children in their recreational time. Across a mass of media which targets children, 'advergames' are becoming a popular platform for advertisers to connect with children online.

The purpose of this experiment is to explore children's responses to exposure to food branding within advergames. It will investigate the marketing techniques used in advergames and online gaming and explore how they influence post consumption and attitudes towards the advertised brand.

**(2) What does the study involve?**

The child will be required to visit the Illawarra Health and Medical Research Institute at the University of Wollongong for approximately 25 minutes.

1) First the child will complete questionnaires that address their current hunger levels and food brand logo recognition.

2) The effectiveness of marketing techniques will be measured by implementing the different techniques into a video game that has been created for the study. It is a web-based side-scroller game in which the player will have 4 minutes to help an alien collect as many

gold coins as they can. The child will be randomly allocated to one of four conditions. The brand advertised in the game will be an overseas brand that is not available in supermarkets Australia.

3) Following the game, the child will be presented with four choices of foods. One of the available foods will be the advertised brand, and the other three will be foods that were not present in any of the video games (one more unfamiliar brand, an unbranded food, and one healthy option). The child will be allowed to choose one of the snacks available to them.

4) The child will then complete the logo recognition questionnaire again, a questionnaire about the game, and will have their height and weight measured.

**As a thank you for the child participating, they will receive a $20 Rebel Sport voucher.**

**(3) Where will the study take place?**

The study will take place in the Illawarra Health and Medical Research Institute (32) at the University of Wollongong.

**(4) How much time will the study take?**

Each child participating will be asked to participate for 25 minutes.

**(5) Who can participate?**

Children aged 7 to 12 years are eligible to participate, as long as their parents have provided **written consent** (please see enclosed consent form) and the child themselves provide verbal consent at the time of the interview. If children would like to participate in the study, then they must contact the researcher via email and provide parental written consent using the form. Children must not have a strong aversion or allergy to Gummy Lollies and Grapes.

**(6) Can my child withdraw from the study?**

Participation in this study is completely voluntary – you are not under any obligation to participate and - if you do participate - you can withdraw at any time without affecting your relationship, or your child's relationship, with the University of Wollongong. You can also choose to withdraw your child's data from the experiment, which will then be erased.

**(7) Will anyone else know the results?**

All aspects of the study, including the results, will be strictly confidential and only the researchers will have access to information on participants.

A report of the study may be submitted for publication or presentation at a conference, but individual participants will not be identified by name.

In accordance with University procedure, the survey data will be securely kept for 5 years before being destroyed. Electronic data will be stored in password protected files and physical data will be stored in a locked filing cabinet in Building 21 at the University of Wollongong.

**(8) What are the benefits of the study?**

This study will contribute new information about the possible impacts of food marketing on children's food brand awareness, attitudes and food behaviours. Understanding the impact of this marketing is important for designing solutions to improve children's dietary intake and nutrition-related health outcomes.

**(9) Can I tell other people about the study?**

You may discuss your child's participation in this study with others as you wish.

**(10) What are the potential risks?**

This study has been reviewed by the University of Wollongong Human Research Ethics Committee. This study poses no physical or emotional harm to children. Information from children will be de-identified following the studies. We will be exposing children to advertising of an unhealthy food brand but this is a food that is not available in Australian supermarkets.

It is very unlikely that a participant will become distressed. If children did become distressed at any point within the study, they will be reminded that their participation is voluntary and they are not required to continue any further.

**(11) What if I require further information?**

If you would like to know more at any stage, please feel free to contact:

Rachel Smith (PhD Student)
Phone: 0481234745; Email: res544@uowmail.edu.au

Dr Bridget Kelly (Senior Lecturer)
Phone: (02) 4221 3893; Email: bkelly@uow.edu.au

Professor Heather Yeatman (Head of School of Health and Society)
Phone: (02) 42839900; Email: heather_yeatman@uowm.edu.au

**(12) What if I have a complaint or concerns?**

Any person with concerns or complaints about the conduct of this research study can contact the Ethics Officer, Research Services Office, University of Wollongong, NSW on 4221 3386 (telephone) or rso-ethics@uow.edu.au (email)

**(13) Who is carrying out the study?**

The study is being undertaken as part of a PhD at the University of Wollongong Early Start Research Institute, by Rachel Smith. It is being funded by an Australian Research Council Linkage Grant: LP140100120 and the Cancer Council NSW.

It is supervised and co-investigated by Dr Bridget Kelly and Professor Heather Yeatman – School of Health & Society, UOW. Other Co-Investigators: Professor Louise Baur, Associate Professor Samantha Thomas, Professor Adrian Bauman, Associate Professor Lesley King, Dr Emma Boyland, Kathy Chapman, Clare Hughes and Associate Professor Stuart Johnstone.

**Appendix N: Parent Information Letter for Peak Sports and Learning (Study Three)**


**PARENT INFORMATION LETTER**
**Research Project**

**Title:** **Exploring how children's food brand associations and food choice preferences are affected by exposures to food marketing within web-based advergames: a Public Health perspective**

This is an invitation to participate in public health research that aims to contribute towards evidence for policy changes within food marketing.

**(1) What is the study about?**

Children's diets may be influenced by frequent and repeated exposure to the promotion of unhealthy food choices. Young children live in a media-saturated environment in which screen time has become the predominant waking activity of children in their recreational time. Across a mass of media which targets children, 'advergames' are becoming a popular platform for advertisers to connect with children online.

The purpose of this experiment is to explore children's responses to exposure to food branding within advergames. It will investigate the marketing techniques used in advergames and online gaming and explore how they influence post consumption and attitudes towards the advertised brand.

**(2) What does the study involve?**

A PhD student and a Research Assistant from the University of Wollongong will visit the centre afterschool and will work with each child once individually, for approximately 25 minutes.

5) First the child will complete questionnaires that address their current hunger levels and food brand logo recognition.

6) The effectiveness of marketing techniques will be measured by implementing the different techniques into a video game that has been created for the study. It is a web-based side-scroller game in which the participant will have 4 minutes to help an alien collect as many gold coins as they can. The participants will be randomly allocated to one of four conditions. The brand advertised in the game will be an overseas brand that is not available in supermarkets Australia.

7) Following the game, the participants will be presented with four food choices. One of the available foods will be the advertised brand, and the other three will be foods that were not present in any of the video games (one more unfamiliar brand, an unbranded food, and one healthy option). The children will be allowed to choose one of the snacks available to them.

8) The child will then complete the logo recognition questionnaire again, a questionnaire about the game and will have their height and weight measured.

**As a thank you for the child participating, they will receive a $20 Rebel Sport voucher.**

**(3) Where will the study take place?**

The study will take place in the Peak – Sport & Learning afterschool centres.

**(4) How much time will the study take?**

The study will take approximately 25 minutes or less.

**(5) Who can participate?**

Children aged 7 to 12 years are eligible to participate, as long as their parents have provided **written consent** (please see enclosed consent form) and the child themselves provide verbal consent at the time of the interview. If children would like to participate in the study, then they must contact the researcher via email and provide parental written consent using the form. Children must not have a strong aversion or allergy to Gummy Lollies and Grapes.

**(6) Can my child withdraw from the study?**

Participation in this study is completely voluntary – you are not under any obligation to participate and - if you do participate - you can withdraw at any time without affecting your relationship, or your child's relationship, with the University of Wollongong or Peak Sport & Learning. You can also choose to withdraw your child's data from the experiment, which will then

be erased.

**(7) Will anyone else know the results?**

All aspects of the study, including the results, will be strictly confidential and only the researchers will have access to information on participants. A report of the study may be submitted for publication or presentation at a conference, but individual participants will not be identified by name.

In accordance with University procedure, the survey data will be securely kept for 5 years before being destroyed. Electronic data will be stored in password protected files and physical data will be stored in a locked filing cabinet in Building 21 at the University of Wollongong.

**(8) What are the benefits of the study?**

This study will contribute new information about the possible impacts of food marketing on children's food brand awareness, attitudes and food behaviours. Understanding the impact of this marketing is important for designing solutions to improve children's dietary intake and nutrition-related health outcomes.

**(9) Can I tell other people about the study?**

You may discuss your child's participation in this study with others as you wish.

**(10) What are the potential risks?**

This study has been reviewed by the University of Wollongong Human Research Ethics Committee. This study poses no physical or emotional harm to children. Information from children will be de-identified following the studies. We will be exposing children to advertising of an unhealthy food brand but this is a food that is not available in Australian supermarkets.

It is very unlikely that a participant will become distressed. If children did become distressed at any point within the study, they will be reminded that their participation is voluntary and they are not required to continue any further.

**(11) What if I require further information?**

If you would like to know more at any stage, please feel free to contact:

Rachel Smith (PhD Student)
Phone: 0481234745; Email: res544@uowmail.edu.au

Dr Bridget Kelly (Senior Lecturer)

Phone: (02) 4221 3893; Email: bkelly@uow.edu.au

Professor Heather Yeatman (Head of School of Health and Society)
Phone: (02) 42839900; Email: heather_yeatman@uowm.edu.au

**(12) What if I have a complaint or concerns?**

Any person with concerns or complaints about the conduct of this research study can contact the Ethics Officer, Research Services Office, University of Wollongong, NSW on 4221 3386 (telephone) or rso-ethics@uow.edu.au (email)

**(13) Who is carrying out the study?**

The study is being undertaken as part of a PhD at the University of Wollongong Early Start Research Institute, by Rachel Smith. It is being funded by an Australian Research Council Linkage Grant: LP140100120 and the Cancer Council NSW.

It is supervised and co-investigated by Dr Bridget Kelly and Professor Heather Yeatman – School of Health & Society, UOW. Other Co-Investigators: Professor Louise Baur, Associate Professor Samantha Thomas, Professor Adrian Bauman, Associate Professor Lesley King, Dr Emma Boyland, Kathy Chapman, Clare Hughes and Dr Frans Folkvord.

**Appendix O: Parental Consent Form for UOW (school holidays children both Sports Camp and non-Sports Camp) (Study Three)**


**Parental Consent Form**

***1) For children aged 7-12years (parents please sign)***

I,.....[PRINT NAME], agree to permit my child ……..……[PRINT CHILD'S NAME], who is aged ..... years, to be a participant in the research project:

**Title:** Exploring how children's food brand associations and food choice preferences are affected by exposures to food marketing within web-based advergames: a Public Health perspective

In giving my consent I acknowledge that:

1. I have read the Parent Information Letter, which explains the aims and the nature of the study and the possible risks, and the statement has been explained to me to my satisfaction.

2. I understand that my child will play a four minute video game that advertises an overseas food brand.

3. I understand that my child will have their height and weight measured.

4. I understand that my child will complete questionnaires including brand recognition and attitudes towards the brand.

5. **I can confirm that my child is not allergic to, nor has a strong aversion to gummy lollies and grapes**.

6. Before signing this Consent Form, I have been given the opportunity of asking any questions relating to any possible physical and mental harm my child might suffer as a result of participation and I have received satisfactory answers.

7. I understand that I can withdraw my child from the study at any time without prejudice to me or my child's relationship to the University of Wollongong.

8. I agree that research data gathered from the results of the study may be published provided that my child and I cannot be identified.

9. I understand that if I have any questions relating to my child's participation in this research, I may contact Bridget Kelly by telephone on 4221 3893.

10. I understand that if I wish to withdraw any information provided by myself or my child at a later date, I may contact Bridget Kelly.

11. I understand that if I have any complaints or concerns surrounding the conduct of the research I can contact the Ethics Officer, Research Services Office at the University of Wollongong via telephone on 4221 3386 or email via rso-ethics@uow.edu.au

12. I acknowledge receipt of a copy of this Consent Form and the Information Sheet.

**Signed:** .....

**Date:** .....

**Name:** .....

**Appendix P: Parental Consent Form for Peak Sports and Learning (Study Three)**


**Parental Consent Form**

***1) For children aged 7-12years (parents please sign)***

I,.....[PRINT NAME], agree to permit my child ……..……[PRINT CHILD'S NAME], who is aged ..... years, to be a participant in the research project:

**Title:** Exploring how children's food brand associations and food choice preferences are affected by exposures to food marketing within web-based advergames: a Public Health perspective

In giving my consent I acknowledge that:

1. I have read the Parent Information Letter, which explains the aims and the nature of the study and the possible risks, and the statement has been explained to me to my satisfaction.

2. I understand that my child will play a four minute video game that advertises an overseas food brand.

3. I understand that my child will have their height and weight measured.

4. I understand that my child will complete questionnaires including brand recognition and attitudes towards the brand.

5. **I can confirm that my child is not allergic to, nor has a strong aversion to gummy lollies and grapes**.

6. Before signing this Consent Form, I have been given the opportunity of asking any questions relating to any possible physical and mental harm my child might suffer as a result of participation and I have received satisfactory answers.

7. I understand that I can withdraw my child from the study at any time without prejudice to me or my child's relationship to the University of Wollongong or Peak Sports and Learning.

8. I agree that research data gathered from the results of the study may be published provided that my child and I cannot be identified.

9. I understand that if I have any questions relating to my child's participation in this research, I may contact Bridget Kelly by telephone on 4221 3893.

10. I understand that if I wish to withdraw any information provided by myself or my child at a later date, I may contact Bridget Kelly.

11. I understand that if I have any complaints or concerns surrounding the conduct of the research I can contact the Ethics Officer, Research Services Office at the University of Wollongong via telephone on 4221 3386 or email via rso-ethics@uow.edu.au

12. I acknowledge receipt of a copy of this Consent Form and the Information Sheet.

**Signed:** .....

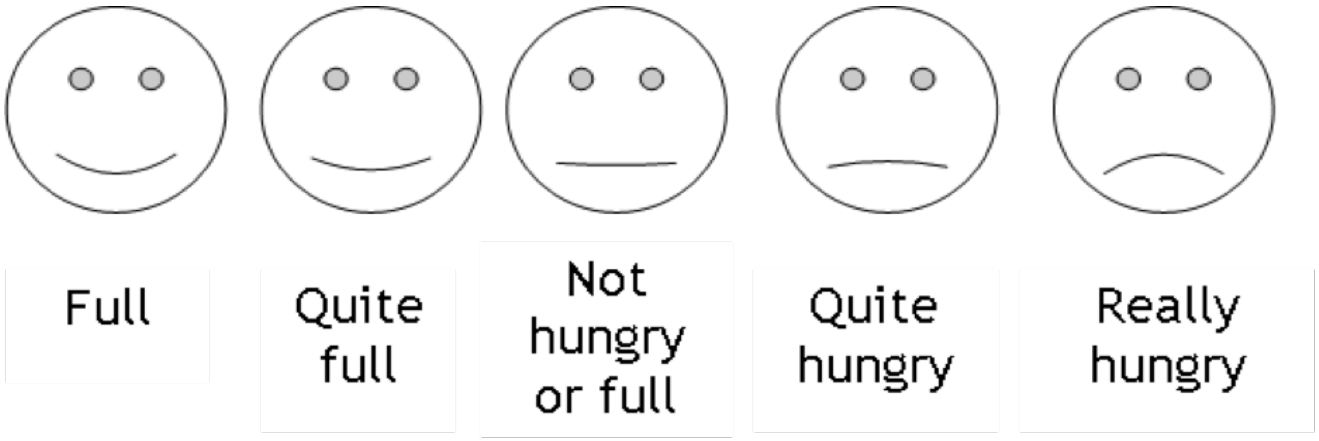
**Date:** .....

**Name:** .....

**Appendix Q: Hunger Scale (Study Three)**

# How hungry are you right now?

How hungry do you feel right now? Please put a tick on the face that best describes how you feel.



**Appendix R: Logo Recognition and Attitudes Questionnaire (Study Three)**

# What logo's do you recognize?

**A logo is a symbol or picture that is often used to represent a brand or product.**

**We would like you to look at each logo and <u>tell us if you have ever seen it before</u>. You may not recognize all of them.**

Example:

You will see a logo and a box for you to fill in.

1) Circle YES if you recognize it and circle NO if you do not recognize it.
2) If you circled YES, tell us what the product is.
3) Using the scales, tell us how you feel about the brand by circling the number that matches your attitude.

No/Yes

What product does it relate to?
McDonalds, fast food restaurant.

Rate it!
Boring –1—2—3—4—5— Fun
Yucky –1—2—3—4—5— Yummy

**Have you ever seen this logo before?**


No/Yes

What product does it relate to?

Rate it!
Boring –1—2—3—4—5— Fun
Yucky –1—2—3—4—5— Yummy


No/Yes

What product does it relate to?

Rate it!
Boring –1—2—3—4—5— Fun
Yucky –1—2—3—4—5— Yummy


No/Yes

What product does it relate to?

Rate it!
Boring –1—2—3—4—5— Fun
Yucky –1—2—3—4—5— Yummy


No/Yes

What product does it relate to?

Rate it!
Boring –1—2—3—4—5— Fun
Yucky –1—2—3—4—5— Yummy


No/Yes

What product does it relate to?

Rate it!
Boring –1—2—3—4—5— Fun
Yucky –1—2—3—4—5— Yummy


No/Yes

What product does it relate to?

Rate it!
Boring –1—2—3—4—5— Fun
Yucky –1—2—3—4—5— Yummy

**Appendix S: Post-game Questionnaire (Study Three)**


First we have a couple of questions about the game you just played.

Please circle your answers and write clearly.

**How fun did you find the game?**

Boring—1—2—3—4—5—Fun

**What was your favourite part about the game?**

**Did you see any branding whilst you were playing the game?**

Yes/No

**If you saw any branding during the game, can you guess what type of product was it?**

**What was the name of the product?**

**Where in the game did you see the branding or advertising?**

## Some more questions…

1. **Do you ever play electronic games on any of the following? Tick all that apply.**

Website

Xbox

PlayStation

Nintendo

IPad/Tablet App

Mobile Phone App

Other (please write down or tell researcher what it is) ……..

I don't play electronic games

2. **How much time do you spend a day playing these games? Tick the amount of time that best fits.**

Never

Less than 30 minutes per day

30 minutes to 1 hour per day

1-2 hours per day

2-3 hours per day

3-4 hours per day

4 or more hours per day

3. **What is your favourite game to play?**

4. **How often do you eat lollies? Tick the amount of time that best fits.**

Never
Couple of times a year
Once a month
Once a week
Couple of times a week
Once a day

5. **If you had a choice to have a snack out of the snacks below, which <u>one</u> of the snacks would you usually choose? Tick which one you would normally like to eat the most.**

Chips
Chocolate
Lollies
Ice cream

**Appendix T: Final Questionnaire (Study Three)**

**Read these statements and circle if you Agree (that it sounds like you) or Disagree (that it doesn't sound like you)**

I am always trying new and different foods – Agree – Disagree

I don't trust new foods – Agree – Disagree

**If you were going to try Rowntree's Randoms© lollies, would you be willing to pay more, compared to a lolly that you would usually choose? Please tick.**

Yes, I'd be willing to pay a lot more for it

Yes, I'd be willing to pay a little more for it

No, I wouldn't be willing to pay more for it

I haven't seen this logo before

***Thank you so much for filling in this questionnaire again.***

***We have one last question.***

**What suburb do you usually live in? (If your Mum and Dad live in separate houses, provide both suburbs)**

_____

## Appendix U: Food Choices (Study Three)

## Appendix V: Literature Review Tables

### Television/Movies

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| Andchutz (2009), The Netherlands | Side effects of television food commercials on concurrent nonadvertised sweet snack food intakes in young children | To test the side effects of television food commercials on nonadvertised sweet snack food intake in young children. | Experimental (between-subjects) | 120 | Mixed, 8-12 years | Children watched a 20 minute movie clip (The March of the Penguins) interrupted by 2 commercial breaks (experimental - 3 food commercials and 2 neutral commercials, control – 5 neutral commercials).The food commercials included: Verkade cookies, McDonalds, Haribo candy, Dr. Oetker muffins, KFC and a Dr.Oetker dessert. While watching, the children could freely eat palatable food (pre weighed bowl of peanut M&Ms). | Television commercials | Energy intake | - No main effect of commercial condition on food intake<br>- Interaction commercial condition × sex on food intake | Good |
| Anderson et al. (2015), Canada | Mealtime exposure to food advertisem | To measure the effect of pubertal | Experimental (within-subjects) | 23 | Mixed, 9-14 years | Children took part in 4 sessions once per week for four weeks. Height and weight measured. Hunger | Television commercials | Energy intake | - Both boys and girls reduced | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| | ents while watching television increases food intake in overweight and obese girls but has a paradoxical effect in boys | status on FI and subjective appetite after pre-meal glucose and whey protein drinks in 9- to 14-year-old boys and girls. | | | | VAS. Children viewed show with four advertisement breaks in a 22-min cartoon (The Simpsons – different episode at each session). Exposure to 15 advertisements in each condition, (glucose drink with food ads, glucose drink with non-food ads, control drink with food ads, control drink with non-food ads). Children randomly assigned to consume equally sweetened drinks containing glucose (1.0 g/kg body weight) or sucralose (control). Followed by ad libitum consumption of pizza. | | | energy intake at the meal in compensation for energy in the glucose beverage.<br>- Food ads resulted in further compensation in boys but not in girls.<br>- Food ads increased energy intake at the meal in OW/OB girls only. | |
| Anschutz et al. (2009), The | Side effects of television food | To test the side effects of television | Experimental (between-subjects) | 120 | Mixed, 8-12 years | The study was conducted in a naturalistic setting designed to look like a living room. A VAS Hunger Scale was | Television commercials | Liking of test food<br><br>Liking of | - Food intake in boys was higher | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| Netherlands | commercials on concurrent non advertised sweet snack food intakes in young children | food commercials on concurrent non advertised sweet snack food intake in young children aged 8-12 y. | | | | administered and children watched a 20 minute movie clip (The March of the Penguins) interrupted by 2 commercial breaks (experimental - 3 food commercials and 2 neutral commercials, control – 5 neutral commercials). The food commercials included: Verkade cookies, McDonalds, Haribo candy, Dr. Oetker muffins, KFC and a Dr.Oetker dessert. While watching, the children could freely eat palatable food (pre weighed bowl of peanut M&Ms). Afterward, they filled out questionnaires and were weighed and measured | | the movie<br><br>Liking of the commercials<br><br>Commercial recall<br><br>Hunger<br><br>Energy intake<br><br>BMI | when they watched the food commercials than when they watched the neutral commercials, whereas food intake in girls was slightly lower when they watched the food commercials than when they watched the neutral commercial. | |
| Anschutz et al. (2010), The | Maternal encouragement to be thin | To test the effects of adult targeted | Experiment (between-subjects) | 121 | Mixed, 8-12 years | Children were exposed to a 20-min movie (The March of the Penguins) that was interrupted by two | Television commercials | Energy intake<br><br>Maternal | - No main effect of commercial | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| Netherlands | moderates the effect of commercials on children's snack food intake | food commercials (energy-dense and light food products) on actual snack food intake in young children while watching television. Furthermore, to investigate the moderating role of maternal behaviours | | | | commercial breaks. These breaks contained 5 commercials promoting either energy-dense foods, low energy versions of the same energy-dense foods (light food commercials), or neutral commercials aimed at adults. Snack food intake during watching television was measured (Ad libitum consumption of Peanut M&M's). Children filled out questionnaires (measuring children's perceptions of their mothers' weight concerns, liking of movie, commercials and test food). Height and weight measured. | | encouragement to be thin | condition on food intake - Interaction commercial condition × maternal encouragement to be thin on food intake | |
| Auty et al. (2004), United Kingdom | Exploring children's choice: The reminder effect of product placement | To understand the influence on children of branded products that appear | Experimental (between-subjects) | 105 | Mixed, 6-12 years | Children were divided into groups into 6-10 years and 11-12 years. Children watched a brief clip of Home Alone. Half the children were shown a clip where Pepsi Cola was spilled during a meal and the other half saw | Product placement in movies | Drink choice | -Those who had seen the branded clip made a significantly | Fair |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| | | in television programs and movies | | | | a clip with no branded products. Children were asked individually to describe in as much detail as possible what they had seen and were offered Pepsi or Coke at the outside of the interview. | | | different choice of drink (experimental group more likely to choose Pepsi or Coke than control group).<br><br>- The responses to the interviews suggest that it is not simply exposure to the film but rather previous exposure together with a reminder in the form of | |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | recent exposure that affects choice.<br>- Age (and by implication processing skill) does not appear to be a mediating factor affecting choice, because implicit memory (mere exposure) seems to be more important than explicit recall | |
| Borzekowski et al. | The 30-second | To examine | Experimental (within- | 46 | Mixed, 2-6 years | Demographic and media use data was collected over the | Television commercia | Food choice | - Children who were | Fair |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| (2001), United States | effect: an experiment revealing the impact of television commercials on food preferences of preschoolers | whether televised food commercials influence preschool children's food preferences | subjects) | | | phone. Children in groups of 2/3 watched a videotape of 2 animated shorts (13 mins each) separated by a 2.5 minute educational segment on sea creatures. 30-second commercials for products (juice, doughnuts, sandwich bread, remote-control toy cards, breakfast cereal, snack cake, fast-food chicken and candy) were inserted into the middle and end of the animations. After this, the children were asked separately which item they would like more out of 2 pictures (one picture would feature an advertised item). | ls | | exposed to a videotape with embedded commercials were significantly more likely to choose the advertised items than children who saw the same videotape without commercials. | |
| Boyland et al. (2008), United Kingdom | Beyond-brand effect of television food advertisements on food choice in children: | To investigate the effect of television food advertising on children's food | Experimental (within-subjects) | 59 | Mixed, 9-11 years | Children were tested on two occasions separated by two weeks (and participated in their school class). One condition involved the children viewing 10 30-second food advertisements followed by a cartoon, in the other condition the children viewed 10 30-second toy | Television commercials | BMI<br><br>Food choice<br><br>Energy intake | -<br>Exposure to food adverts produced substantial and significant increases in energy | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| | the effects of weight status | intake, specifically whether childhood obesity is related to a greater susceptibility to food promotion | | | | adverts followed by the same cartoon. Children were given the opportunity to eat from assortment on foods (Quaker Snack-aJacks; Haribo jelly sweets; Cadbury's chocolate buttons; Walker's potato crisps; and green grapes. 100g each. Ad libitum eating with no time constraint. | | | intake in all participants.<br>- The increase in intake was largest in obese children.<br>- In the food advert condition, total intake and intake of these specific snack items correlated with the children's BMI. | |
| Boyland et al. (2015), United Kingdom | Exposure to 'healthy' fast food meal | To examine how exposure | Experimental (within-subjects) | 59 | Mixed, 7-10 years | The study design had two conditions: control (exposure to ten toy adverts across two breaks of five adverts each) | Television commercials | BMI<br><br>Nutritional knowledge | - Children's liking for fast food, | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| | bundles in television advertisements promotes liking for fast food but not healthier choices in children | to advertising for 'healthy' meal bundles to children can influence the selection of food in children. | | | | and experimental (the middle advert in each break replaced with one for a McDonald's Happy Meal® depicting the meal bundle as consisting of fish fingers, a fruit bag and a bottle of mineral water). Following viewing of the adverts embedded in a cartoon, children completed a hypothetical menu task that provided children with coloured labelled images of McDonald's foods and asked them to mark the items they would choose if they were constructing a McDonalds Happy Meal at that moment. Nutritional knowledge, height and weight of the children were measured. | | Liking of food advertised | in general, increased after exposure to the food adverts relative to control<br>- Compared to children with high nutritional knowledge, those with low scores selected meals of greater energy content (305 kJ) after viewing the food adverts.<br>- | |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Exposure to adverts for 'healthy' meal bundles did not drive healthier choices in children, but did promote liking for fast food. | |
| Brown et al. (2017), United States | Influence of product placement in children's movies on children's snack choices. | To determine if children's snack choices or consumption differs based on: 1) recent exposure to movies with high versus low product | Experimental (between-subjects) | 114 | Mixed, 9-11 years | Before the study a at-home online questionnaire was completed by children for age, race, height and weight. Another at-home online questionnaire completed by parents assessed average household income, age, race, and child's height and weight. When children came in for the study, they completed a questionnaire asking when they last ate, and rated their current hunger level on a 1 to 10 scale. | Product placement | Food intake<br><br>Food choice<br><br>BMI<br><br>Hunger rating | - Participants consumed an average of 800.8 kcal; mean kcal eaten did not vary by movie watched.<br>- Participan | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| | | placement of unhealthy foods; and 2) children's weight status. | | | | Children were then assigned to watch a high (Alvin and the Chipmunks) or low (Stuart Little) product-placement movie. After viewing, participants selected a snack choice from each of five categories, several of which were specifically featured in "Alvin." | | | ts who watched the high product-placement movie had 3.1 times the odds (95% CI 1.3-7.2) of choosing cheese balls (most featured snack) compared to participants who watched the low product-placement movie. - Children's weight status did not | |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | significantly affect their choice of snack. | |
| Bruce et al. (2016), United States | The influence of televised food commercials on children's food choices: Evidence from ventromedial prefrontal cortex activations | To investigate how food commercials influence children's food choices. | Experimental (between-subjects) | 23 | Mixed, 8-14 years | Children were weighed and measured and reported their hunger (11-point VAS scale). 60 food images were used (30 healthy, and 30 unhealthy). In a behavioural food rating task, children were asked to rate each of the 60 foods based on taste and health. Children watched a 15-min commercial (food: Applebees, Chili's Grill & Bar, Denny's, McDonald's, Subway, Wendy's or non-food) at the beginning of each block in the fMRI food decision task. Each brand commercial was shown a total of 6 times (2 for each block condition in 2 different versions). In the fMRI children were asked how much they would like to eat the 60 food choices. After the fMRI study, desirability and | Television commercials | BMI<br><br>Ratings of food<br><br>Ratings of commercials | - Watching food commercials changes the way children consider the importance of taste when making food choices.<br>- Children did not use health values for their food choices, indicating children's decisions | Fair |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | familiarity ratings for each commercial were acquired separately via a 5-point Likert scale | | | were largely driven by hedonic, immediate rewards (i.e., "tastiness"); however, children placed significantly more importance on taste after watching food commercials compared with non-food commercials. This change was accompanied by | |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | faster decision times during food commercial trials.<br>- The ventromedial prefrontal cortex, a reward valuation brain region, showed increased activity during food choices after watching food commercials compared with after watching | |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | non-food commercials.<br>- Overall, watching food commercials before making food choices may bias children's decisions based solely on taste, and that food marketing may systematically alter the psychological and neurobiological mechanisms of children's | |

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| | | | | | | | | | food decisions | |
| Chernin (2008), United States | The effects of food marketing on children's preferences: Testing the moderating roles of age and gender | To examine the influence of food marketing on children's preferences and test whether age (and gender) moderate the effects of ad exposure.<br><br>Mediating variable | Experimental (between-subjects) | 133 | Mixed, 5-11 years | Participants were randomly assigned to view either the Sprinkle Spangles commercial or the Tang commercial. A vocabulary test was administered (the Expressive One-Word Picture Vocbulary-Test-2000). 2 weeks later, participants watched a 13-minute segment of 'Fosters Home for Imaginary Friends' which was embedded with one of the two experimental commercials across two commercial breaks. Participants then completed several measures about the television show and the commercials. Parents completed a brief survey about family demographics. Participants were asked to choose which product they preferred (one measure was associated with a product they had seen advertised, and one associated with the | Television commercials | Vocabulary score<br><br>Product preference | - Exposure to food commercials increased children's preferences for the advertised products.<br>- Age did not moderate this effect; younger and older children were equally persuaded by the commercials.<br>- Boys were more influenced by the | Good |

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| | | | | | | product they had not seen advertised). For each measure, the advertised product was compared to 3 alternatives in the same product category. The products were evaluated using paired comparisons, a method where each item is matched with every other item and participants then choose one item in each pair. The question wording for the Sprinkle Spangles measure was, "If you could eat one of these two cereals for breakfast tomorrow, which one would you choose?" The wording for the Tang measure was, "If you could have a glass of one of these two drinks, which one would you choose?" The dependent variable in the analyses below captured the number of times the advertised product was chosen over a competitor. | | | commercials than girls. | |
| Dixon et al. (2017), | Food marketing | To test whether | Experimental | 904 | Mixed, 5-9 years | Online experiment. Four conditions: | Product placement/ | Food choice | - Children showed a | Good |

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| Australia | with movie character toys: Effects on young children's preferences for unhealthy and healthier fast food meals | movie tie-in premiums (MTIPs) accompanying unhealthy and healthier fast food meals influenced children's meal preferences and their perceptions of these meals. | (between-subjects) | | | a) Unhealthy and healthier meals with no MTIP (control) b) Unhealthy and healthier meals with MTIP c) Unhealthy meals with MTIP and healthier meals without MTIP d) Unhealthy meals without MTIP and healthier meals with MTIP Participants were shown a trailer for a current children's movie followed by an advertisement for an associated McDonald's Happy Meal® (conditions B-D) or an advertisement for a children's leisure activity (condition A). They were then shown four McDonald's Happy Meal® options on screen and asked to select their preferred meal before completing detailed meal ratings on product perception. | movie tie-ins | Product perception | preference for unhealthy meals over healthier ones. - Children were significantly more likely to select a healthier meal over an unhealthy meal when only the healthier meals were accompanied by a MTIP (condition D) compared to the | |

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| | | | | | | | | | other three conditions - When healthier meals were accompanied by a MTIP, children reported the meal looked better, would taste better, they would be more likely to ask their parents for this meal, and they would feel happier if their | |

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| | | | | | | | | | parents bought them this meal, compared to when the healthier meal was not accompanied by a MTIP | |
| Dixon et al. (2007), Australia | The effects of television advertisements for junk food versus nutritious food on children's food attitudes and preferences | To assess the impact of varying combinations of TV advertisements (ads) for unhealthy and healthy foods on children's dietary knowledge, attitudes and | Content analysis and experimental (between-subjects) | 919 | Mixed, grade 5-6 | Pre-test survey examined associations between children's cumulative, naturalistic exposure to TV advertising and food-related beliefs, attitudes and behaviour. Participants watched the same 30 min episode of 'The Simpsons' with four clusters of five ads embedded (content dependent on the condition). Experimental manipulation conducted 1 week after the pre-test survey involved a 2 (junk food ads/no junk food ads)×2 (healthy food ads/no | Television commercials | Food attitude Food preference | - Advertisements for nutritious foods promote selected positive attitudes and beliefs concerning these foods. | Good |

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| | | intentions. | | | | healthy food ads) design resulting in four conditions: (1) junk food ads: Kellogg's Froot Loops, Pepsi, Cadbury Chocolate and KFC, (2) junk food and healthy food ads, (3) healthy food ads: Weet-Bix, Dairy food of life, Fruit & Veg and lamb (4) no food ads (control). Participants completed (pre-post) questionnaires on their attitudes, liking of foods, social norms, perceived healthiness, intentions, usual junk food intake, usual TV use, impact of diet (post only) and self-rating of diet. Height and weight measured. | | | | |
| Emond et al. (2016), United States | Randomized exposure to food advertisements and eating in the absence of hunger among | To explore whether exposure to unhealthy food advertisements promotes cued eating | Experimental (between-subjects) | 60 | Mixed, 2-5 years | Children completed the experiment at a behavioural laboratory. Children were provided with a healthy snack to consume upon arrival (peeled banana, sliced cheese, crackers and water). After this children rated their satiety on a 3-point VAS. Children asked to taste a | Television commercials | BMI<br><br>Hunger<br><br>Liking of snack<br><br>Energy intake | - Child BMI was not related to eating in the absence of hunger (EAH).<br>- Mean kilocalorie | Good |

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| | preschoolers | in preschoolers. | | | | piece of each of the 2 snacks provided in the EAH phase and rate how much they liked it on a 5-point VAS. Children were then randomized to view a 14-minute TV program (Elmo's World from Sesame Street) embedded with advertisements for either a 1 food (ie, 9 advertisements, 15 or 30 seconds each, for Bugles corn chips, food condition) or a national department store (6 advertisements, 30 seconds each, non-food condition). Total advertisement time in each condition was 3 minutes. Children were provided 2 snack foods (Nabisco Teddy Grahams and Bugles corn snacks) to consume ad libitum while viewing the TV program; 1 of those snacks was the food advertised (Bugles). Parents completed a subscale of the Child Feeding Questionnaire (about parental feeding restriction | | | s consumed during the EAH phase was greater among children exposed to the food advertisements versus those exposed to the non-food advertisements), an effect driven by greater consumption of the advertised food | |

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| | | | | | | and child self-regulation). Childs height and weight measured. | | | | |
| Esmaelipour et al. (2018), Iran | Children's food choice: Advertised food type, health knowledge and entertainment | To examine how the moderating effects of health knowledge (inactive vs. active) and advertising's entertainment level (high vs. low) affect children's response to advertising's food content (unhealthy vs. healthy) | Qualitative and experimental (between-subjects) | 330 | Mixed, 6-11 years | Qualitative study: used to identify healthy and unhealthy food choices to use in the experimental study. In depth interviews with 7 nutritionists. Experimental study: Conditions - Food type (healthy vs unhealthy), health knowledge (inactive vs active) and entertainment experience (low vs high). 6 health knowledge questions were asked to the active health knowledge group. Children either played an advergame (5 mins) with healthy or unhealthy food, or watched TV advertising (2 mins) with healthy or unhealthy food. Children then made hypothetical food choice out of 12 items. | Television commercials & advergames | Food choice | - Children tended to choose more unhealthy foods after exposure to unhealthy food advertising.<br>- This effect was greater for a higher level of entertainment, and was successfully moderated by the activation of health | Fair |

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| | | | | | | | | | knowledge.<br>- Embedding health messages in advertising (included TV advertising and advergames) helps retrieve children's health knowledge and therefore, choosing less unhealthy food by them. | |
| Ferguson (2014), United States | Advertising and fictional media | To evaluate whether advertising | Experimental (between-subjects) | 304 | Mixed, 3-12 years | Parents completed demographic form (child's height, weight, television viewing habits, frequency of | Television commercials | BMI<br><br>Food choice | - Young children (3-5) were influenced | Fair |

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| | effects on healthy eating choices in early and later childhood | for food influences choices made by children, the strength of these influences, whether there is a difference in developmental stage and whether they might be easily undone by parental influences | | | | fast food eating and the child's primary attraction to fast food). Children randomly assigned to watch a cartoon (Tom and Jerry) containing one of two McDonalds commercials (either healthy – apple dippers, or unhealthy – French fries). This commercial was played alongside a Lego commercial, and a trailer for an upcoming Cars 2 movie. As children were given a food coupon to make a hypothetical selection, parents were randomly assigned to a script that either suggested that the children selected the healthier food choice or that they should choose what they most wanted. | | | by media clips of food whether advertisements or fictional. - Middle elementary children (6–8) were influenced mainly by their parents, whereas older children (9+) were influenced by neither of these. | |
| Ferguson et al. (2012), United States | Advertising influences on young children's food | To evaluate whether advertising for food influences | Experimental (between-subjects) | 75 | Mixed, 3-8 years | Parents completed demographic form (child's height, weight, television viewing habits, frequency of fast food eating and the child's primary attraction to | Television commercials | BMI<br><br>Food choice | - Children were more likely to choose the advertised item | Fair |

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| | choices and parental influence | choices made by children, the strength of these influences, and whether they might be easily undone by parental influences | | | | fast food). Children randomly assigned to watch a cartoon (Tom and Jerry) containing one of two McDonalds commercials (either healthy – apple dippers, or unhealthy – French fries). This commercial was played alongside a Lego commercial, and a trailer for an upcoming Cars 2 movie. As children were given a food coupon to make a hypothetical selection, parents were randomly assigned to a script that either suggested that the children selected the healthier food choice or that they should choose what they most wanted. | | | despite parental input. | |
| Gatou et al. (2016), Greece | The short-term effects of television advertisements of cariogenic foods on | To investigate the short-term influence of the advertising of | Experimental (within-subjects) | 183 | Mixed, 11-12 years | Questionnaire administered to caregiver to determine dietary habits and leisure activities.1st Day - Children completed DEBQ-C and dental examinations carried out. 2nd/3rd Day – Groups of participants shown a one of | Television commercials | Advertisement recall<br><br>Advertisement recognition | - Exposure to food advertisements significantly decreased | Good |

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| | children's dietary choices | cariogenic foods on children's dietary preferences, and the possible moderating effect of several factors on this influence. | | | | two 20 minute cartoons containing 8 advertisements. One cartoon contained advertisements for added sugar food (e.g fruit juice, chocolate egg) and the other cartoon contained advertisements for non-food products (e.g a mobile phone, a CD). 3 week interval between conditions. Children then asked to write down the advertisements they had remembered and then asked to check the advertisements they had seen from a random series of 16 photographs. Finally, the children were asked to check on a card a selection of food items that they would like to eat at that particular moment. The card contained eight photographs of food – four with added sugar, namely 'unhealthy' choices and four without added sugar, namely 'healthy' choices. | | Food choice<br><br>DMFT (decayed missing and filled teeth)<br><br>Dietary habits/leisure activities | the selection of healthy foods.<br>- Children with a higher DMFT index chose a higher percentage of unhealthy foods, and children who spent more time watching television chose an increased number of healthy foods, after their exposure to food advertisements. | |

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| | | | | | | | | | - Regardless of condition, girls selected fewer foods than boys.<br>- Children with a higher DMFT index selected more unhealthy foods than children with a lower DMFT index.<br>- Obese children chose an increased number of healthy foods than | |

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| | | | | | | | | | those who were overweight and normal weight. | |
| Gilbert-Diamond (2017), United Kingdom | Television food advertisement exposure and FTO rs9939609 genotype in relation to excess consumption in children | To assess how television food advertisements affect eating in the absence of hunger among children and whether the fat mass and obesity associate gene would modify the effect of food advertisem | Experimental (between-subjects) | 172 | Mixed, 9-10 years | Buccal cell swabs were collected before lunch and successfully genotyped. Participants were served a standardized lunch (choice from macaroni cheese, pizza bites, or chicken nuggets with ketchup, along with string cheese, carrots & dressing, apple slices, bread, butter milk and water). All meals were nutritionally similar and high in energy to induce satiety. After lunch participants given a 5-point Hunger Likert scale. 2 conditions. They were then shown a 34-minute show (Figure it Out! Nickelodeon) embedded with either 7.7 minutes of food (gummy candy) or toy advertisements. Participants were provided with a snack to consume ad | Television commercials | Energy intake<br><br>Hunger rating<br><br>Fat mass and associated gene<br><br>BMI | - Participants who viewed food advertisements consumed an average of 48 kcals more of a recently advertised food than those who viewed toy advertisements.<br>- There was a statistically | Good |

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| | | ents.<br><br>Moderating variable | | | | libitum while watching the show (gummy candy, cookies, chocolate and cheese puffs). Height and weight was recorded. Estimated daily energy requirement (EER) was calculated. | | | significant interaction between genotype and food advertisement condition where the difference in consumption of a recently advertised food related to food advertisement exposure increased linearly with each additional FTO risk allele, even after controlling for body | |

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| | | | | | | | | | mass index percentile. | |
| Goldberg et al. (1978), United States | Tv messages for snack and breakfast foods: Do they influence children's preferences? | To investigate if television messages for snack and breakfast foods influence children's preferences | Experimental (between-subjects) | 80 | Mixed, first grade | 5 conditions: sugared snack and breakfast food commercials (4.5 minutes); repetition of sugared snack and breakfast food commercials (9 minutes) – Mounds Candy Bars, Lollipop Lifesavers, Crackerjacks, Hershey Candy Bars, Blow Pops, Milky Way Candy Bars, Kool Aid, Sugar Crisps, and Fruity Pebbles; pro-nutrition PSA's for more wholesome snack and breakfast foods (4.5 minutes) – fruit, eggs, milk, and vegetables; repetition of PSA's for more wholesome snack and breakfast foods (9 minutes); control (no programme). Participants in their school classes were randomly divided into groups of 7/8 and watched the 24 minute animated programme 'Yogi's gang'. Participants provided | Television commercials | Food choice<br><br>Perception of healthy and unhealthy foods | - The participants who viewed the sugary commercials chose more sugary foods than those who viewed the PSA's and no commercials at all.<br>- There was no significant difference between levels of exposure (4.5 vs 9 minutes).<br>- Children had | Poor |

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| | | | | | | with a hypothetical choice of 3 items from 6 snacks on a board (2 of which were advertised): Mounds Candy Bars, Lollipop Lifesavers, jelly beans, raisins, a banana and peanuts. This was repeated 3 more times with 6 more foods (2 of which were advertised). Participants were then asked the same two more times but with breakfast foods as the choices (3 healthy, 3 unhealthy). Participants were then asked about their awareness of the healthy or unhealthy nature of the foods they had just seen. Experimenter then returned to the original hypothetical choices offered and asked the children for the 6 boards whether they thought the foods were good or bad for them. | | | accurate responses to what foods were healthy and unhealthy. | |
| Gorn et al. (1980), Canada | Children's responses to repetitive | To assess whether child viewers | Experimental (between-subjects) | 151 | Boys, 8-10 years | 6 conditions. Children viewed 30min episode of The Flintstones with either: 1) no commercial inserts (control), | Television commercials | BMI<br><br>Food choice | - Interaction of number of | Poor |

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| | television commercials | respond like adults to varying degrees of repetition and to repetitive or varied sets of commercials for the same product. | | | | 2) one ice cream commercial, 3) one ice cream commercial repeated 3 times 4) 3 different ice cream commercials, 5), one ice cream commercial repeated 5 times, 5 different ice cream commercials. Asked questions on preference/commercial recollection and hypothetically asked what snack they would like from Bubble Gum, Chocolate Bar, Ice Cream Cone or a Bag of Chips. Children given choice of chocolate or vanilla ice-cream (one quart) and given 15-minutes during a neutral programme to eat as much as they wanted. Height and weight measured | | Energy intake<br><br>Commercial recollection | commercials recalled and brand preference as a function of the number of exposures.<br>- No difference between viewing repeated or different commercials.<br>- Higher recognition of brand name and correct number of flavors, in experimental conditions<br>- | |

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| | | | | | | | | | Exposure to commercials was not effective in increasing consumption of ice-cream. | |
| Gorn et al. (1982), Canada | Behavioral evidence of the effects of televised food messages on children | To assess the causal link between exposure to varying types of televised food messages and the nature of children's actual food selection and consumption | Experimental (between-subjects) | 288 | Mixed, 5-8 years | Every afternoon for 14 days, participants (approx. 36 at once) watched a different 30minute television cartoon. There were 4.5 minutes of 30-second commercials during the cartoon. The four conditions were:<br>- Candy commercials (Hersheys, Mounds, Almond Joy, Kit Kat, Three Musketeers, Kool Aid, M&M's, Lifesavers, Crackerjacks etc)<br>- Fruit commercials (oranges, orange juice, apples, grapes, yoghurt)<br>- Public service announcements (messages on | Television commercials | Food choice<br><br>Energy intake<br><br>Attitudes to foods | - Children who viewed candy commercials picked significantly more candy over fruit as snacks.<br>- Eliminating the candy commercials proved as effective | Poor |

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| | | | | | | the value of moderating one's intake of sugar and eating a balanced variety of foods each day)<br>- No commercials.<br>Participants asked to evaluate each message using a Likert scale for 5 items. After viewing the cartoon children asked to select a small glass of an available beverage (orange juice or Kool Aid) and two of the four snacks (two fruits and two candy bars) and had 15 minutes to eat. Participants were then asked about their attitudes towards the snack foods. | | | in encouraging the selection of fruit as did exposing the children to fruit commercials or nutritional public service announcements. | |
| Halford et al. (2004), United Kingdom | Effect of television advertisements for foods on food consumption in children | To examine lean, over weight and obese children's ability to recognise eight food and eight non-food related | Experiment (within-subjects) | 42 | Mixed, 9-11 years | Children tested in groups on two occasions separated by two weeks. One condition involved the children viewing food advertisements followed by a 10-minute cartoon, in the other condition the children viewed non-food adverts followed by the same cartoon. They viewed the other advertisements on the | Television commercials | TV commercials and recognition<br><br>Food choice<br><br>Energy intake | - No significant difference in the number of non-food commercials recognised between lean and obese | Good |

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| | | television adverts | | | | second occasion. Participants asked to complete commercial recognition questionnaire. Participants were then divided into groups of 4/5 and each participant was presented with 4 foods (Ryvita wholegrain crackers – low-fat savoury; Haribo jelly sweets – low-fat sweet; chocolate – high-fat sweet); and butter puffs (high-fat savoury). Ad libitum eating with no time constraint. After the second session participants completed DEBQ and weight and height measured. | | Assessment of externality<br><br>BMI | participants<br>- Significant difference in number of food commercials recognised between lean and obese participants.<br>- The ability to recognise the food commercials significantly correlated with the amount of food eaten after exposure. | |

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| | | | | | | | | | - The consumption of all the food offered increased post food advert (with exception of low-savoury snack). | |
| Halford et al. (2007), United Kingdom | Beyond-brand effect of television (TV) food advertisements/commercials on caloric intake and food choice of 5-7-year-old children | To explore whether recent exposure to TV food adverts could affect subsequent total food intake and food choice in young children. To | Experimental (within-subjects) | 93 | Mixed, 5-7 years | Children tested on two occasions separated by two weeks (children took part in their school class). One condition involved the children viewing 10 30-second food advertisements followed by a cartoon, in the other condition the children viewed 10 30-second toy adverts followed by the same cartoon. Children divided into groups of 4/5 and given opportunity to eat from assortment on foods (Quaker Snack-a-Jacks; Haribo jelly | Television commercials | Product recognition<br><br>BMI<br><br>Food choice<br><br>Energy intake | - Food advert exposure produced a significant increase in total food intake in young children.<br>- Exposure to food advertise | Good |

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| | | explore whether any difference existed in the ability to recognise food adverts between normal weight and overweight /obese children at this age. | | | | sweets; Cadbury's chocolate buttons; Walker's potato crisps; and green grapes. 100g each. Ad libitum eating with no time constraint. Product recognition questionnaire and weight and height measured. | | | ment increases food intake in all children, but recognition of food commercials is related to body mass index (BMI). - Beyond their effects on brand choice, exposure to food commercials promotes over-consumption in younger children. | |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| Halford et al. (2008), United Kingdom | Children's food preferences: effects of weight status, food type, branding and television food advertisements (commercials) | To investigate the effects of weight status, food type and exposure to food and non-food advertisements on children's preference for branded and non-branded foods. | Experiment (within-subjects) | 37 | Mixed, 11-13 years | Participants (in school class groups) watched video in their classroom. The video consisted of 10 30-second advertisements followed by 15-minutes of a cartoon (Scooby Doo).The advertisements were either for food items (Birds Eye Fishfingers, Burger King restaurant, Heinz Baked Beans, Kellogg's CocoPops, DairyLea Lunchables, McDonalds restaurant, Nestle Cheerios, Nestle MilkyBar, Masterfoods Skittles, & Proctor and Gamble Pringles) burg, or toys (also recorded both children's and family programming on the UK's most popular commercial channels. The sessions were in a randomized order, 2 weeks apart. Following the video, participants were given four measures to complete: 2 food preference measures, a food choice measure, and an | Television commercials | BMI<br><br>Advertisement recall list<br><br>Food preference<br><br>Food choice | - Normal weight children selected more branded and non-branded food items after exposure to food advertisements than in the control (toy advertisement) condition.<br>- Obese and overweight children showed a greater preference for branded foods than | Good |

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| | | | | | | advertisement recall measure. | | | normal weight children per se, and also in this group only, there was a significant correlation between food advertisement recall and the total number of food items chosen in the experimental (food advertisement) condition. | |
| Harris et al. (2018), United States | Food and beverage TV advertising | To assess young children's responses | Experimental (between-subjects) | 84 | Mixed, 4-7 years | Children participated in age groups of 4-5 and 6-7 years, in a group size of 3-5 people. Two television | Television commercials | Brand attitude Advertisement | - Both pre-schoolers (4–5 | Fair |

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| | to young children: Measuring exposure and potential impact | to food advertisements commonly viewed on TV programming primarily directed to children under age 12 | | | | advertisements were randomly selected for each group to watch twice. Children's attitudes to the advertisements were measured by pictorial scale with smiley faces (liking, coolness, fun, made them happy). Attitude towards brand also measured, along with previous viewing of the ad and previous consumption. | | attitude | years) and slightly older children (6–7 years) liked the child-directed food ads they viewed in this study - Despite companies ' claims that these ads are directed to children ages 6 and older, there was no significant main effect of age on ad liking, although | |

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| | | | | | | | | | previous product consumption may have affected brand liking for older children more than for younger children. | |
| Harris et al. (2018), United States | Teaching children about good health? Halo effects in child-directed advertisements for unhealthy food | To examine effects of health messages promoting nutrient-poor foods in child-directed advertising. | Experimental (between-subjects) | 138 | Mixed, 7-11 years | Children viewed three child-friendly commercials in one of three conditions: (1) health halo (unfamiliar nutrient-poor food/drink ads with healthy messages); (2) nutrient-poor food/drink ads with other messages and (3) healthy food/drink ads. They were alone and watched each commercial twice. Children provided with a range of snacks and were told they could eat as much as they wanted (20 mins ad libitum). Snacks included carrots, | Television commercials | Attitudes<br><br>Food choice<br><br>Energy intake | - Children in the health halo condition rated the advertised nutrient-poor products as significantly healthier compared with | Good |

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| | | | | | | grapes, potato chips, cookies, fruit snacks and goldish crackers. They rated the taste of the snacks and then rated the commercials and advertised products, and provided attitudes about exercise and nutrition. | | | children in other conditions (p = .003), but the other commercials did not affect children's attitudes about other advertised products (p's > .50). - Child age, gender or TV viewing habits did not significantly predict their ratings (p's > .18). - There was | |

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| | | | | | | | | | no evidence that healthy lifestyle messages and/or healthy food commercials improved children's attitudes about nutrition, exercise or healthy snack consumption. | |
| Harris et al. (2009), United States | Priming effects of television food advertising on eating behavior | To investigate whether exposure to food advertising during television viewing | Experiment (between-subjects) | 118 | Mixed, 7-11 years | Participants (on their own) watched a 14-minute cartoon (Disney's Recess) that contained either 4 30-second food advertisements in the breaks (high-sugar cereal, waffle sticks with syrup, fruit roll-ups, and potato chips) or 4 30-second advertisements | Television commercials | Energy intake<br><br>BMI<br><br>Children's media habits | - Children consumed significantly more food (in general) when exposed to food | Fair |

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| | | may contribute to obesity by triggering automatic snacking of available food. | | | | for other games and entertainment products. All participants received a large bowl of cheddar cheese 'goldish' crackers (150g) and were told that they could have a snack whilst watching. Parents separately completed questionnaire on children's media habits, liking of goldfish crackers, height, weight and demographic information. | | Liking of test food | advertising.<br>- Food advertising increased consumption of products not in the presented advertisements. | |
| Lorenzoni et al. (2017), Georgia | Effect of TV advertising on energy intake of Georgian children: Results of an experimental study | The aim of this study was to investigate the influence of TV viewing and TV advertising on energy intake in Georgian children | Experimental (between-subjects) | 60 | Mixed, 3-11 years | Participants were exposed to 1 of the following 5 levels of television and television advertising: No TV, TV without ad, TV with 1 ad, TV with 2 ads or TV with 3 ads. The stimuli used was a cartoon (22 minutes). The advertisements lasted 30 seconds and referred to the snack given to children during the experiment (chocolate-based product). Each child could request up to 12 snacks throughout the film. A standardised questionnaire was | Television commercials | Energy intake<br><br>Brand awareness | · Findings from the present experimental study showed no association of TV viewing and TV advertising with energy intake in a sample of Georgian | Good |

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| | | | | | | administered to parents. First section asked about demographics and second part assessed children's food habits and physical activity. Weight and height measured. Brand awareness questionnaire administered to children. | | | children. | |
| Matthes et al. (2015), Austria | Children's consumption behaviour in response to food product placements in movies | To tests the effects of brand placements on children's food consumption. | Experimental (between-subjects) | 121 | Mixed, 6-14 years | Children were exposed to a 7-minute excerpt from the movie Alvin and the Chipmunks. In all three conditions, the clip tells the same story. Moderate frequency condition: included Chipmunks eating Cheese Balls. High frequency condition: Moderate condition scene plus an additional Cheese Balls clip. Control group: saw a comparable 7-minute segment of the movie without the Cheese Balls. After movie children given choice from Cheese Balls and two similar cheese snacks (or no snack) and were allowed to consume | Product placement | Food choice<br><br>Free brand recall<br><br>Brand attitude<br><br>Food intake | - Exposure to high-frequency product placements exerted a significant effect on snack consumption, but no effect on brand or product attitudes. These effects were independent of | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | | | | | | their chosen snack. Children given short interview and asked to retell the scene they had just seen. | | | children's ages. | |
| Neyens et al. (2017), United Kingdom | Transferring game attitudes to the brand: persuasion from age 6 to 14 | To replicate previous findings regarding the differential impact of TV advertising and advergames on children's brand attitudes and pester intentions. | Experimental (between-subjects) | 940 | Mixed, 6-14 years | Participants were randomised to watch a TV ad, play an advergame, or the no marketing condition. Participants watched a TV fragment of a popular youth series (10 minutes). After 2 minutes and 45 seconds, the TV series was interrupted by a 19-second Kellogg's Coco-Pops Mission Jungle 2 commercial. Afterwards, participants were given a standardized, online questionnaire | Television commercial | Brand attitude<br>Intention to pester<br>Brand preference<br><br>Brand recognition<br><br>Source recognition<br><br>Source intent<br><br>Attitude towards advertising format | · Watching the TV ad did not enhance children's brand attitude and pester intent compared to a no advertising exposure control group<br>· Brand attitudes, pester intent, and brand preferences were lower among | Fair |

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| | | | | | | | | | children who had watched the TV ad compared to children who were not exposed to any advertising | |
| Norman et al. (2018), Australia | Sustained impact of energy-dense TV and online food advertising on children's dietary intake: a within-subject, randomised, crossover, counter- | To see whether children would eat more at a snack after food advertising exposure compared with non-food advertising. To see whether exposure | Experimental (within-subjects) | 160 | Mixed, 7-12 years | Study took place across four, six-day school holiday camps. Two media conditions (TV + advergame) or single media (TV only) which all advertised unfamiliar food brands. Participants in the multimedia condition played an advergame individually for 5 minutes. Half of these participants were exposed to non-food brands, and the other half unhealthy food brands. Two groups of 20 children formed for each camp. Children were given | Television commercials and advergames | Brand recognition<br><br>BMI<br><br>Energy intake | - Children within the TV plus advergame group ate significantly more snack foods after food advertising (201 kJ) compared with non-food advertisin | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | balanced trial | to food advertising across multiple media would have an increased effect on children's immediate snack intake compared with those only exposed to food advertising from a single media source<br>To see if any increased energy consumed as a result of | | | | breakfast, morning tea and lunch. Any difference in energy intake was measured to determine if energy intake was compensated for at lunchtime meal. Height and weight measured. | | | g, whilst children in the TV only group ate similar amounts at the snack after both the food and non-food advertise ments | |

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| | | exposure to food advertising was compensated for by children consuming less energy at the later lunchtime eating occasion. | | | | | | | | |
| Panic et al. (2013), Belgium | Comparing TV ads and advergames targeting children: the impact of persuasion knowledge on behavioral responses | To examine the impact of persuasion knowledge evoked by a commercial and a noncommercial advergame on persuasive effects | Experimental (between-subjects) | 254 | Mixed, 7-10 years | Participants were sequentially exposed to a fragment from SpongeBob SquarePants (a popular children's television program), followed by the Lay's potato chips commercial showing people eating Lay's chips (2 minutes). | Television commercials | Attitude toward the advertisement<br><br>Purchase requests<br><br>Understanding of the commercial source<br><br>Understanding persuasive intent | · The results show a significant negative effect of persuasion knowledge on purchase request<br>· There was no significant effect of the attitude | Fair |

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| | | | | | | | | | toward the advertising format on purchase request | |
| Pettigrew et al. (2013), Australia | The effects of television and Internet food advertising on parents and children | To examine the impact of television and Internet food advertising on Australian parents and children | Experimental (between-subjects) | 2604 | Mixed, 8-14 years and their parents | Participants were exposed to a Television advertisement, an Internet advertisement or control pictures for four commonly advertised energy-dense, nutrient-poor foods. All television advertisements were 30 seconds and promoted; Fried chicken (family eating chicken together at dinner) popcorn (mother making popcorn for her child playing outside on a trampoline), a snack bar (children eating the product at school), and confectionery (athlete eating the sweets after a training session). The control group saw static images of the food products. After exposure, participants were then asked a series of questions about the products. | Television commercial and internet advertising | Brand preference<br><br>Brand attitude<br><br>Frequency of consumption<br><br>BMI | · Advertising can lead both parents and children to evaluate products more favourably and influence their perceptions of the desirability and acceptability of food products<br>· The evaluation | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | | | | | | | | | s were more favourable among the advertising exposure groups relative to the control group | |
| Resnik et al. (1977), United States | Children's television advertising and brand choice: A laboratory study | To determine whether mere exposure to a non-informative product advertisement on television is sufficient to create a desire for that product. | Experimental (between-subjects) | 45 parents responded | Mixed, 6-8 years | The children were randomly assigned to one of 3 conditions: quasi-natural, quasi-natural control, and traditional. Children watched a video-taped segment of 'Jeanie'. Those in the quasi-natural group were shown a potato chip commercial, the quasi-natural control viewed the original network advertising, and the control traditional group were asked to watch TV. Afterwards experimenter asked 'dummy' questions to prevent children from figuring out the experiment. The child was | Television commercials | Food choice | - Children's brand choices were found to be influenced significantly by the communication of the commercial message for the previously | Fair |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | | | | | | then asked which bag of potato chips they would most like to have (out of two choices – one was advertised). | | | -unknown brand. | |
| Toomey et al. (2013), United States | Branded product placement and pre-teenaged consumers: influence on brand preference and choice | To examine the effect of product placement on brand preference and choice | Experimental (between-subjects) | 69 | Mixed, 8-12 years | Participants were invited to watch a feature film. Prior to the film the treatment group were exposed to a Coca-Cola Zero product placement in a video, while the control group was exposed to a non-branded drink. The total time run for the videos were 4 minutes 21 seconds. Participants were then asked to complete the choice measure to choose a drink. Participants were then given their chosen refreshment. A post-assessment packed was sent to participants two weeks after the experiment, including a measure of product preference and choice. | Product placement | Brand preference Food choice | · The placement of branded products in a television program developed for pre-teenagers may not influence attitudes or behaviour of the pre-teenaged consumers · Pre-teens exposed to a branded product | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | | | | | | | | | placement were not more likely to choose that brand immediately following exposure or two weeks later. | |
| Ülger (2009), Turkey | Packages with cartoon trade characters versus advertising: An empirical examination of preschoolers' food preferences | To examine whether advertising or packaging is more influential in children's preferences. | Experimental (between-subjects) | 144 | Mixed, 6 years | Questionnaires distributed to collect demographics and tv use patterns Participants watched 8 cartoon films (49 minutes 31 seconds) Treatment group saw eight commercial breaks for Ülker Chocolate Wafer , and the control group didn't view any commercials. After viewing, the participant was given an option to choose one of two chocolate biscuits (one that was in the commercial, the other had an image of Disney cartoon characters). | Television commercials | Product choice | · Both the participants who watched the CD with Product B commercials and the ones who watched it without commercials preferred Product A - the one | Fair |

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| | | | | | | | | | with the child-appeal package.<br><br>· Cartoon trade characters on packages would have stronger effects on food preferences of preschoolers compared to TV advertising | |
| Uribe et al. (2015), Chile | The effects of TV unhealthy food brand placement on children. | To evaluate the effects (cognitive, affective and behavioura | Experimental (between-subjects) | 483 | Mixed, 9, 12 & 15 years | Participants were exposed to an edited 45-minute version of the film Richie Rich containing one or two scenes depicting product placements of McDonald's and/or commercial break(s) with a | Television commercials and product placement | Cognitive response<br><br>Affective response<br><br>Brand | · Exposure to placement had a relevant effect on | Fair |

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| | Its separate and joint effect with advertising | l) of this promotional tool in that product category<br><br>To describe the effects of junk food brand placement at different age groups (9, 12 and 15 years old). | | | | McDonald's advertisement about Big Mac's. Participants were randomised into four groups with different levels of the stimuli. Participants immediately answered questions after the film. | | preference | increasing top of mind brand awareness and that using placement with advertising increased this effect even more.<br><br>· The presence of the communications tools included in this study (in any condition) improved the dispositio | |

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| | | | | | | | | | n toward the category and the brand. Moreover, the joint use of advertising and placement increased these behavioural dispositions more than the separate use of them.<br>· The differences between age groups demonstrated that defences against | |

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| | | | | | | | | | commercial attempts are actually present at the age of 12 | |

## Packaging

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| Ares et al. (2016), Uruguay | Influence of label design on children's perception of two snack foods: | Aimed at comparing rating and choice-based conjoint to study the influence | Experimental (between subjects) | 238 | Mixed, grades 1-6 | Two popular snack products were used as target products: yogurt and sponge cake. For each product, labels were designed using three 2-level variables: cartoon character (present vs. absent), nutrition claim (present vs. absent) | Promotional characters and labelling | Evaluation of labels<br><br>Food preference | - The inclusion of cartoon characters and nutrition claims positively | Fair |

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| | Comparison of rating and choice-based conjoint analysis | of three design variables (cartoon characters, nutrition claims and traffic-light system) on the hedonic reaction of school-aged children towards labels of two popular snack foods: yogurt and sponge cake. | | | | and front-of-pack nutritional information (Guideline daily amount (GDA) system vs. traffic light system). Participants were divided into two groups of similar size who performed either a rating or a choice-based conjoint task. The rating-based conjoint involved the evaluation of 8 labels using a hedonic scale, whereas in the choice task children had to select the label they would like the most from each of 8 pairs of labels. | | | influenced children's preferences | |
| Arrua et al. (2017), Uruguay | Influence of label design on children's perception | To evaluate the influence of label | Experimental (between-subjects) | 221 | Mixed, 9-13 years | Labels of 2 snack products (yogurt and sponge cake) were designed using a fractional factorial design with 3 2-level variables | Promotional characters | Product attitude | - Low-income children showed a more | Fair |

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| | of 2 snack foods | design on children's perception of 2 popular snack foods across 3 income levels. | | | | (present vs absent): cartoon character (unfamiliar characters – dinosaur and bear), nutrition claims, and front-of-package nutritional information. Children's attitude towards the products were measured in 10-20 minutes. | | | positive attitude toward the products than did middle- and high-income children -The inclusion of cartoon characters on food labels is associated with fun. Low-income children seem more susceptible to the marketing strategies of food companies than do middle- | |

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| | | | | | | | | | and high-income children | |
| Dixon et al. (2014), Australia | Effects of nutrient content claims, sports celebrity endorsements and premium offers on pre-adolescent children's food preferences: experimental research | To assess pre-adolescent children's responses to common child-oriented front- of-pack food promotions | Experimental (between-subjects) | 1302 | Mixed, grade 5-6 | Perceived weight status recorded. Participants randomly assigned to: nutrient content claims, sports celebrity endorsements, and premium offers. Online, participants chose their preferred product from a randomly assigned EDNP (energy dense, nutrient poor) food pack (sweetened breakfast cereal, cheese dip snacks, ice cream bars, frozen chicken nuggets and flavored milk) and comparable healthier food pack then completed detailed product ratings on 7-point Likert scales. Participants asked to indicate whether they thought the EDNP food product contained high or low levels of four nutrients. Participants rated the EDNP and healthier comparison products on how healthy they considered the product to be | Labelling | Food choice Perceptions on nutritional content Product ratings | - Compared to the control condition, children were more likely to choose EDNP products featuring nutrient content claims (both genders) and sports celebrity endorsements (boys only). - Perceptions of nutritional content | Good |

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| | | | | | | and whether they thought the product looked fun, tasty, as good as other brands, good value for money and popular with children. Participants also rated a typical child who would eat/drink the brand, how they thought the brand would make them feel, how likely they were to buy the product and their interest in tasting the product. | | | were enhanced by nutrient content claims.<br>- Effects of promotions on some product ratings (but not choice) were negated when children referred to the nutrition information panel.<br>- Premium offers did not enhance children's product | |

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| | | | | | | | | | ratings or choice. | |
| Elliott et al. (2013), Canada | Food branding and young children's taste preferences: A reassessment | To examine the effects of branding and packaging on young children's taste preferences. | Experimental (between-subjects) | 65 | Mixed, 3-5 years | Questionnaires delivered to parents on child's demographic details, the number of television sets in their home and their usual behaviours with watching TV and the extent with their interactions with McDonalds and Starbucks. Participants randomly assigned to one of three packaging pairs: 1) McDonald's versus plain (white) wrapping 2) McDonald's versus coloured (non-branded) wrapping; and 3) McDonald's versus Starbucks wrapping. The participants tasted five pairs of identical foods (¼ McDonald's hamburger, 1 Chicken McNugget®, 3 McDonald's fries, 2 baby carrots, and ½ mini-cupcake) one at a time (in a randomized order) in their conditions associated packaging. Participants asked if the foods tasted the same | Branding | Taste preference | Children preferred the taste of foods wrapped in decorative wrappings, relying more on aesthetics than on familiar branding when making their choices | Fair |

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| | | | | | | or if one tasted better and where they thought the food was from. | | | | |
| Forman et al. (2009), United States | Food branding influences ad libitum intake differently in children depending on weight status. Results of a pilot study | To examine whether overweight (OW) children are more sensitive to the intake-enhancing effects of food branding than non-OW children, and that the relationship between weight status and intake of branded foods is mediated by level of | Experimental (within-subjects) | 43 | Mixed, 4-6 years | Children's height and weight measured. Four dining occasions in the Child Taste and Eating laboratory. On two of the visits, children received meals in which the brands on all foods were clearly visible ("branded"), while on the other two visits, all foods were packaged in plain, unrecognizable plastic bags or containers ("unbranded"). Children allowed to eat ad libitum for 30 minutes. Food brand recognition by pairing 1 logo with 1 food from 3 choices. | Branding | BMI<br><br>Energy Intake<br><br>Brand recognition | - OW children consumed significantly more energy per meal than non-OW<br>- Child age and brand awareness were positively associated<br>- OW children consumed an additional 40kcal in branded vs. unbranded meals whereas non-OW | Good |

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| | | food brand awareness | | | | | | | children consumed 45kcal less in branded meals | |
| Gregori et al. (2013), Latin America | Investigating the obesogenic effects of marketing snacks with toys: an experimental study in Latin America | To determine whether toys packaged with food are indeed increasing the amount of food eaten by children, and if this effect is enhanced by contemporary exposure to TV and/or advertising | Experimental (between-subjects) | 660 | Mixed, 3-10 years | Children's height and weight measured. Participants then either watched no cartoon or 22-minute Disney Pluto cartoon with: no commercials, one commercial, two commercials, or three commercials. Participants watch 22 minute cartoon. During this time participants were either offered a chocolate snack with a toy, or the chocolate on its own and could eat ad libitum during the 22 minutes. IBAI questionnaire – assessment of child's brand awareness | Toys | BMI Skinfold measures<br><br>Brand awareness<br><br>Energy intake | - The inclusion of toys in food packages was not shown per se to lead to an increase in the caloric intake of children | Good |
| Gregori et al. (2014), | Food packaged | To investigate | Experimental | 1,680 | Mixed, 3-11 years | Participants' height and weight measured. | Toys | BMI | - Food consumpti | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| India | with toys: an investigation on potential obesogenic effects in Indian children | whether toys added to food increase food consumption and if contemporary exposure to TV and/or advertising is a further promoting factor | (between-subjects) | | | Participants given a brand awareness questionnaire (International Brand awareness Instrument, IBAI). Participants either watched no cartoon or 22-minute Disney Pluto cartoon with: no commercials, one commercial, two commercials, or three commercials. Participants watch 22 minute cartoon. During this time participants were either offered a chocolate snack with a toy, or the chocolate on its own and could eat ad libitum during the 22 minutes. Parents of participants given questionnaire on demographic information and families eating habits. | | Brand awareness<br><br>Energy intake | on was not influenced by added toys, even after adjustment for potential confounding factors | |
| Josion-Portail (2012), France | Children, packaging and on-pack nutritional information: An explorator | To explore children's perception of on-pack nutritional messages and the potential | Cross-sectional<br><br>Semi-structured interviews | 10 | Mixed, 7-12 years | Participants were shown the packaging of 3 different products: cereals. Individual fruit compote and chocolate biscuits.<br>Upon presentation of the package, participants were asked if they knew the | Labelling | Product description<br><br>Product attitude<br><br>Willingness to try the | - Children between 7 and 12 years old perceive nutritional information | Good |

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| | y study | perception in their evaluation of products.<br><br>To evaluate whether children perceive on-pack nutritional messages and identify a potential link between their perception of this information and their judgement of a products healthiness. | | | | product, if they could describe the product, if they would like to try the product and why, which information they think is important to understand the product, and if they think it's healthy and why. Each interview lasted around 30 minutes. | | product<br><br>Product evaluation | available on product packages and refer to them when evaluating products in terms of healthiness.<br>- Children's perceptions and understanding of nutritional information are not always correct.<br>- Nutritional elements do not seem to be a key | |

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| | | | | | | | | | driver in children's demand for the product. | |
| Keller et al. (2012), United States | The impact of food branding on children's eating behaviour and obesity | To determine if the presence of familiar food brands alone would result in increased intake of a multi-item buffet meal compared to a control condition where foods were served in plain packaging (unbranded). | Study 1: Experimental (between-subjects)<br><br>Study 2: Cross-sectional<br><br>Study 3: Experimental (between-subjects) | Study 1: 43 participants<br><br>Study 2: 41 participants<br><br>Study 3: 16 | Study 1: Mixed, 4-6 years<br><br>Study 2: Mixed, 7-9 years<br><br>Study 3: Mixed, 4-5 years | Study 1: Participants were randomized to the order in which they received four test-meals, two "unbranded" meals and two "branded" meals. In the unbranded meals, all foods were served in plain, white plastic containers. In the branded meals, all foods were served in their original brand packaging. Prior to the test meal, a brand awareness test was administered.<br><br>Study 2: Participants attended two dinner sessions where they were randomly assigned to receive a test-meal that was either "branded" with fast food logos or "unbranded". For the Food Brand Stroop Task, a total of 136 different food image photographs were | Branding | Energy intake<br><br>BMI<br><br>Cognitive bias | - Branding is an important influence on what and how much children eat, but some children may be more susceptible to these influences than others.<br>- There was a trend for all children, regardless | Good |

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| | | To translate these effects to food intake, a more direct link to diet and body weight regulation. A second goal of this study was to develop a modified Stroop task to test the hypothesis that OW children have an attentional bias toward food brand images. | | | | printed on cards. Half of the images were of foods without brand logos, and the rest were pictures of common food brand logos. Upon presentation of the images, children were asked to either read the word or identify the food image.<br><br>Study 3: Families attended small-group sessions with researchers where baseline measures were taken and family-based nutrition education was delivered (groups of 2 or 3). Families received 24, eight-ounce plastic containers filled with various fruits and vegetables, and parents were instructed to offer them to their children 3 times per day at meals. Participants in the intervention group received containers with cartoon characters, and control group's containers had plain packaging. | | | of weight status, to eat more at the branded compared to the unbranded meal.<br>- Although the Stroop task revealed a possible cognitive bias towards food brand images in overweight children, we did not find that overweight children consumed more when the | |

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| | | | | | | | | | test-meal was served in meals branded with fast food logos compared to when it was served in plain packaging - Children in the interventi on group consumed more servings of both fruits and vegetables across the three study time points: baseline, treatment, and | |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | | | | | | | | | control. | |
| Kellershohn et al. (2018), United Kingdom | Young children's perceptions of branded healthy fast food | To examine the role of branding on healthy fast food items | Experimental (within-subjects) | 20 | Mixed, 4-6 years | Experiment involved card sorts lasting 10-22 minutes. Participants performed one open sort and four closed card sorts about food preferences, perceived healthiness and perceived parental preferences using branded (McDonalds, Subway & Starbucks) and non-branded food image cards. Five sorts were completed with deck one, followed by five sorts with deck two. Deck one was an apple in seven forms (3 unbranded and 4 branded). Deck two comprised of 9 different food items (whole apple, sliced apple, whole orange, orange segments, baby carrots, cheeseburger, french fries and yogurt cup). After sorting, the interviewer asked the child to describe each pile they had created. | Branding | Food choice<br><br>Taste<br><br>Perceived healthiness<br><br>Perceived food choice of mother | - Children have a strong opinion of what food items will taste good, which items are healthy and which items a parent might want them to eat and these classifications, while they may overlap, are distinct to them<br>- Brand logos influenced some of | Good |

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| | | | | | | | | | the children's perceptions on how a common food item would taste. However, the branding did not elevate the perception of the apple slices in the bags, in terms of taste or healthiness compared to the whole fruit. | |
| Kotler et al. (2012), United | The influence of media | To assess the role of media | Experimental (between- | 343 | Mixed, 2-6 years | Experiment 1: Participants interviewed individually and asked to | Promotional characters | Food preference | - When foods within the | Good |

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| States | characters on children's food choices | characters in influencing children's food choices | subjects) | | | pick one food from each of 9 pictured pairs they would like to eat. The three conditions were; no characters associated with food, Sesame Street characters associated with food, and unknown characters associated with food.<br>Experiment 2:<br>Children were asked to taste each of the 3 chosen food pairs from the previous experiment. The 3 conditions were; food without characters, food with Sesame street character placed in front of one of 1st item, and then the Sesame street character placed in front of the second item. Interviews wrote down how much was consumed. | | Food choice<br><br>Energy intake | same category (i.e., two vegetables) were competing against each other, character identification influenced children's food choice.<br>- The presence of favoured characters on healthier food options was not powerful enough to lure children | |

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| | | | | | | | | | away from the tasty, non-nutritious snack.<br>- Children ate more pieces of foods when a Sesame Street character branded those foods compared with an unknown character | |
| Lapierre et al. (2011), United States | Influence of licensed spokeschar acters and health cues on children's ratings of cereal taste | To investigate whether licensed media spokeschar acters on food packaging and | Experimen tal (between-subjects) | 80 | Mixed, 4-6 years | Participant's viewed 1 of 4 professionally created cereal boxes and tasted a "new" cereal. Manipulations included presence or absence of licensed cartoon spokescharacters on the box and healthy or sugary cereal name. The 4 conditions were: healthy cereal name, sugary | Promotion al characters | Taste<br><br>Food preference | · The use of popular characters on food products affects children's subjective assessmen t of taste. | Fair |

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| | | nutrition cues affect young children's taste assessment of products. | | | | cereal name, character present, and character absent. The characters were Mumble and Gloria from the film "Happy Feet". Participants given small cup holding a 10-g dry serving of the cereal to taste, and asked questions about how much they liked it, and if they knew who the characters were (8-10 minutes). During the taste test, parents filled out a questionnaire about child's media use and consumer behaviours, and the parent's attitude toward media use. | | | · Children who saw characters on their cereal box reported significantly higher taste ratings than children whose box did not feature the characters · The name of the cereal also played an important role in shaping children's assessment of the product, | |

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| | | | | | | | | | with less favourable opinions about the Sugar Bits. | |
| Letona et al. (2014), United States | Effects of licensed characters on children's taste and snack preferences in Guatemala, a low/middle income country | To collect data to inform policy makers regarding the need to regulate food marketing to children.<br><br>To examine whether licensed characters displayed on food packaging influence Guatemalan children´s | Experimental (within-subjects) | 121 | Mixed, 4-11 years | Face to face interviews were conducted with participants' mother, father, grandparent or other family member to gather information on participant's age and television viewing habits. Participants tasted 3 food types: potato chips, crackers and carrots. Each was presented in 2 identical packages, except that one had a licensed character and the other did not. Children tasted the foods (6 total) in each package and answered whether they tasted the same or one tasted better. Snack preference was then evaluated. | Promotional characters | Food preference<br><br>Taste<br><br>Character identification | - Licensed characters on food packaging influence Guatemalan children's taste and snack preferences.<br>- Guatemalan children significantly prefer the taste and are more likely to choose foods for | Good |

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| | | taste and snack preferences | | | | | | | snack that feature licensed characters on the packaging - There were no other significant associations between taste and snack preference and gender, time spent watching television, movies watched per week, character liking or recognition. | |
| Marshall et al. (2006), | Examining the | To determine | Experimental (within- | 43 | Mixed, 3-5 years | Participants had to undertake a shopping task every | Colour | Product choice | - Favourite | Fair |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| United Kingdom | relationship between product package colour and product selection in pre-schoolers | the role of colour in product packaging selection for preschool children across three food categories; cereals, biscuits, drinks. | subjects) | | | morning for 3 mornings. The procedure involved completing three tasks (12-15 minutes total): First they had to choose one cereal packet, one biscuit packet and one can of drink for themselves. Next, they had to choose one of each product for a boy. Lastly, they had to choose one of each product for a girl. Participants then answered questions on why they made these selections, what their favourite colour was, and their favourite breakfast cereal, biscuit and drink. | | Favourite colour | colours are related to package colour selection for preschool children. The results showed a high correlation between favourite colour and choice of product across the total sample. - This study found limited evidence of pre-schoolers making | |

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| | | | | | | | | | the link between packaging colour and the brands they recalled. | |
| McGale et al. (2016), United Kingdom | The influence of brand equity characters on children's food preferences and choices | To assess the influence of brand equity characters displayed on food packaging on children's food preferences and choices | Experimental (within-subjects) | 209 | Mixed, 4-8 years | Participants asked to rate their taste preferences and preferred snack choice for 3 matched food pairs, presented either with or without a brand equity character displayed on packaging (such as Coco the Monkey on the Coco Pops Snack Bar). Study 1 addressed congruent food–character associations and study 2 addressed incongruent associations. Participants were also asked to rate their recognition and liking of characters used. Height and weight measured. Parents filled out a questionnaire prior to the experiment. | Promotional characters | Taste preference<br><br>Character identification/likeability<br><br>Food choice | - Children were significantly more likely to show a preference for foods with a brand equity character displayed on the packaging compared with a matched food without a brand equity character, | Good |

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| | | | | | | | | | for both congruent and incongruent food–character associations.<br>- The presence of a brand equity character also significantly influenced the children's within-pair preferences, within-pair choices, and overall snack choice (congruen | |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | | | | | | | | | t associations only). | |
| Miller at al. (2011), United States | Children's use of on-package nutritional claim information | To understand how on-package nutritional claims influence children's choices | Experimental (between-subjects) | 124 | Mixed, 8-12 years | Participants received 4 laminated cards that each represented a different cereal box. Only 1 of the cereals contained a health/nutrient claim (in the claim- present conditions). There were 4 conditions: control (no claim), nutrient content claim, health claim and general claim. Data was collected in small groups ranging from 1-4 participants. They were asked to choose the cereal they would like and to place it on top of their set of cereal cards. Participants then answered questions about their choices. | Labelling | Food choice<br><br>Perceived healthfulness | - The presence of an on-package claim in the choice set led to unhealthier choices<br>- General claims still led to avoidance and an increased propensity to choose less healthful products | Fair |
| Ogle et al. (2017), United States | Influence of cartoon media characters on children's attention to | To examine whether adding licensed media characters | Experimental (within-subjects) | 149 | Mixed, 6-9 years | Each participant completed 60 trials that required them to view product pairs (e.g. dried fruit vs fruit snack) within a given food/beverage category and chose which product in the pair they wanted to eat. | Promotional characters | Visual attention<br><br>Product choice | - Licensed media characters were effective at capturing | Good |

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| | and preference for food and beverage products | to healthful food/ beverage packages increases children's attention to and preference for these products. | | | | For each food pair, it was varied whether each food was more or less healthful and whether each food displayed a character (Lightning McQueen, SpongeBob and Dora).<br><br>Children saw six possible combinations of less- or more-healthful foods with or without characters across 10 randomly selected food/beverage pairs. | | | children's attention.<br><br>- Children viewed products with characters significantly more often and for more time than products without characters.<br><br>- When children were choosing between more-healthful products with characters and less-healthful | |

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| | | | | | | | | | products without characters, the less-healthful products tended to be preferred. | |
| Roberto et al. (2010), United States | Influence of licensed characters on children's taste and snack preferences | To study how popular licensed cartoon characters appearing on food packaging affect young children's taste and snack preferences. | Experimental (within-subjects) | 40 | Mixed, 4-6 years | Parents completed questionnaires before the study. In the study participants were presented with 3 pairs of food products in the following categories; Low-nutrient, low-energy, Low-nutrient, high-energy and High nutrient, low-energy. One package in each food pair had a licenced cartoon character (Scooby Doo, Dora and Shrek). Participants were asked to taste both items and asked if they tasted similar, and which one they preferred. | Promotional characters | Taste preference and Snack preference<br><br>Identification of cartoon character | - Causal relationship between the appearance of licensed characters on food packaging and children's reported taste and snack preferences.<br><br>- Children preferred the taste | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | | | | | | | | | of a food when a licensed character appeared on it. The majority of participants favoured the taste of the licensed-character samples according to all 3 taste comparisons. | |
| Robinson et al. (2007), United States | Effects of fast food branding on young children\'s taste preferences | To investigate whether preschool children's taste preferences were influenced | Experimental (within-subjects) | 63 | Mixed, 3-5 years | Participants sat at a table with a tray in front of an opaque screen. One research assistant sat behind the screen and could not see the participant. Research assistant No. 2 placed 2 samples of each of 5 foods in front of the participant, 1 at a | Branding | Brand recognition<br><br>Taste Product preference | - Low-income preschool children preferred the tastes of foods and drinks if they | Good |

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| | | by branding from a heavily marketed source | | | | time, on the left and right sides of the tray. The foods were McDonald's hamburgers, chicken nuggets, McDonald's French fires, 1% fat milk and baby carrots. Each tray had two of the same item with one wrapped in McDonald's packaging and the other in plain packaging. Children were asked about the origin of the food and their taste preference. Parents were given a questionnaire to answer on behalf of their child about television viewing habits and food/drink ads. | | | thought they were from McDonald's, demonstrating that brand identity can influence young children's taste perceptions. This was true even for carrots, a food that was not marketed by or available from McDonald's | |
| Smits et al. (2012), Belgium | Endorsing children's appetite for | To measure the effects | Experimental (between- | 57 | Mixed, 6-7 years | The interviewer conducted a base line measurement and a follow up measurement with | Celebrity endorsements and | Frequency of consumpti | - Adding a spokes-character | Fair |

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| | healthy foods: Celebrity versus non-celebrity spokes-characters | of celebrity versus non-celebrity spokes-characters without interference of other potentially important factors (such as the congruency with the product) | subjects and within-subjects) | | | each participant (12-20 mins each). A set of questions were repeated for four types of foods (grapes, chocolate, apples and cookies). Participants were asked to indicate frequency of consumption, current appetite and the frequency they asked their parents to buy these foods. In the follow up measurement the same pictures of foods were used, but instead they were accompanied by a "Kabouter Karel" (gnome) a licenced character. One healthy item and one unhealthy item were accompanied by the gnome. The other unhealthy and healthy item was accompanied by a non-celebrity gnome. Half the participants first rated the foods endorsed by the popular gnome while the other participants first rated the foods endorsed by the generic gnome. | promotional characters | on<br><br>Frequency of purchase requests<br><br>Hunger | (i.e., a gnome) to a food product increases the appetite, the (intended) frequency of consumption and the (intended) frequency of parent requests for that product among 6- to 7-year-old children, for both unhealthy and healthy foods.<br>- The effect of | |

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| | | | | | | | | | the celebrity spokes-character is in all cases greater than the effect of a similar (but unknown) gnome. | |
| Ülger (2009), Turkey | Packages with cartoon trade characters versus advertising: An empirical examination of preschoolers' food preferences | To examine whether advertising or packaging is more influential in children's preferences | Experimental (between-subjects) | 144 | Mixed, 6 years | Questionnaires were distributed to collect demographics and TV use patterns. Participants watched 8 cartoon films (49 minutes 31 seconds). The treatment group saw eight commercial breaks for Ülker Chocolate Wafer and the control group didn't view any commercials. After viewing, the participant was given an option to choose one of two chocolate biscuits (one that was in the commercial, the other had an image of Disney cartoon | Promotional characters | Product choice | · Both the participants who watched the CD with Product B commercials and the ones who watched it without commercials preferred Product A. the one | Fair |

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| | | | | | | characters). | | | with the child-appeal package.<br><br>· Cartoon trade characters on packages would have stronger effects on food preferences of pre-schoolers compared to TV advertising | |

Digital games

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| Folkvord et al. (2013), The Netherlands | The effect of playing advergames that promote energy-dense snacks or fruit on actual food intake among children | To examine the effect of advergames that promote energy-dense snacks or fruit on children's ad libitum snack and fruit consumption.<br><br>To examine whether this consumption differs according to brand and product type | Experimental (between-subjects) | 270 | Mixed, 8-10 years | Participants randomly assigned to 1 of 4 conditions (energy-dense snacks advergame, fruit advergame, non-food advergame or no game at all). Participants in the treatment groups played the advergame individually – memory task game with brands and products on backs of cards (5 minutes). After the game, participants were given 4 different bowls that contained 4 different food snacks to eat. Two bowls contained energy-dense food snacks, and 2 bowls contained sliced fruit snacks. Two bowls of test food, such as cola bottles and bananas, were identical to one of the food products shown in the advergame. Participants then verbally completed a questionnaire and the height and weight of children was measured. | Advergame | BMI<br><br>Energy intake<br><br>Food choice<br><br>Hunger<br><br>Brand attitude | - Playing an advergame containing food cues increased general energy intake, regardless of the advertised brand or product type (energy-dense snacks or fruit), and this activity particularly increased the intake of energy-dense snack | Good |

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| | | (energy-dense snacks and fruit). | | | | | | | foods.<br>- Children who played the fruit version of the advergame did not eat significantly more fruit than did those in the other groups. | |
| Folkvord et al. (2014), The Netherlands | Impulsivity, "advergames," and food intake | To examine the role of impulsivity in the effect of advergames that promote energy-dense snacks on children's | Experimental (between-subjects) | 261 | Mixed, 7-10 years | Participant's impulsivity scores were assessed with a computer task. They then played an advergame promoting either an energy-dense snack or non-food product. Advergame involved memory task with brands and products on backs of cards (5 minutes). Half the children in each condition were rewarded for refraining from eating, the other half | Advergame | Impulsivity<br><br>BMI<br><br>Energy intake<br><br>Hunger<br><br>Attitude | - Playing an advergame promoting energy-dense snacks contributes to increased caloric intake in | Good |

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| | | snack intake. | | | | were not. While playing, two bowls of energy-dense snacks were presented, and children were allowed to eat freely. Food was weighed before and after consumption. After the game, participants completed an attitude questionnaire and their height and weight was measured. Hunger was assessed before and after the advergame. | | | children.<br>- The advergame promoting energy-dense snacks overruled the inhibition task to refrain from eating among impulsive children, making it more difficult for them to refrain from eating. | |
| Folkvord et al. (2015), The Netherland | The role of attentional bias in the effect of food | To examine the moderating role of | Experimental (between-subjects) | 92 | Mixed, 7-10 years | Pre-experimental questionnaire was handed out to assess demographics and hunger (3 minutes). Participants were then sat in | Advergame | Energy intake<br><br>Attentional bias | - The results showed that playing an | Good |

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| s | advertising on actual food intake among children | attentional bias in the effect of food advertising on actual food intake among children. | | | | front of a computer and their eyes were calibrated. Participants individually played an advergame with either energy-dense snack or non-food promotions whilst their eyes were tracked. The game involved a memory task with brands and products on backs of cards (5 minutes). After the game, participants were given two bowls of food, and given 5 minutes to eat. Participants then filled out the second part of the questionnaire which assessed liking of the test food, brand and product recognition, attitude to the advergame, frequency of playing similar advergames at home, and attitude to the candy brand. | | Hunger | advergame containing food cues increased total intake<br>- Children with a higher gaze duration for the food cues ate more of the advertised snacks<br><br>- Children with a faster latency of initial fixation to the food cues ate more in total and ate more | |

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| | | | | | | | | | of the advertised snacks. The number of fixations on the food cues did not increase actual snack intake. | |
| Folkvord et al. (2017), The Netherlands and Spain | Does a 'protective' message reduce the impact of an advergame promoting unhealthy foods to children? An experimental study in Spain and The Netherland | To examine whether incorporating a 'protective' message in an advergame promoting energy-dense snacks would reduce children's snack | Experimental (between-subjects) | 597<br><br>Netherlands = 215<br><br>Spain = 382 | Mixed, mean age: Spain = 8.9<br>Netherlands = 9 | Participants completed a short questionnaire about hunger levels, age, gender etc. 2 (advergame either energy-dense snacks vs non-food) by 2 (protective messages present vs absent) design. The 5 minute game involved a memory task with 16 cards; the brands appeared on the back of the cards, and the individual products (candy or toys) appeared on the front of the cards. Participants had to complete as many games as they could in the time limit. Energy | Advergames | Hunger<br><br>Energy intake<br><br>BMI<br><br>Memory of a protective message | - Playing an advergame promoting energy-dense snacks increased caloric intake in both countries, irrespective of whether the | Good |

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| | s | intake. | | | | dense advergame = promoting a popular candy brand and 8 different gummy and jelly sweets from this popular candy brand. Nonfood advergame = promoting a popular Dutch toy brand and 8 individual toys from this brand. The 'protective' message was a line of text that was prominently visible, in the center in the upper part of the screen, which stated: "Remember: This game is an advertisement for 'X'." During the advergame playing, children were presented with two bowls of energy-dense snacks; (1) jelly candy (cola bottles) and (2) milk chocolate candy shells. The jelly candy cola bottles were identical to the food products shown in the advergame promoting energy-dense snacks. Participants could eat freely from the bowls. Final questionnaire for | | | 'protective' message was present or not. | |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | | | | | | participant's persuasion knowledge and asked if the children remembered seeing the protective message. Height and weight measured. | | | | |
| Harris et al. (2012), United States | US food company branded advergames on the internet: Children's exposure and effects on snack consumption | To demonstrate potential impact of exposure to branded food games on food company website. | Experimental (between-subjects) | 152 | Mixed, 7-12 years | 3 conditions. Participants played 2 advergames on computer screen in whichever order they wanted as long as they played each once for 12 minutes. Healthy advergames = Dole foods (fruit and vegetable consumption). Unhealthy advergames = Pop tarts and Oreo cookies (sweet snack foods). Advergames = JewelQuest and TumbleBugs. Choice of food = carrots, grapes, fruit snacks, goldfish crackers, potato chips and chocolate chip cookies. Participants to choose one pre-weighed 50g (100g for carrots and grapes) and consume for 5 minutes. After 5 minutes participant complete questionnaire on attitudes towards the food. Participants were permitted | Advergame | Food choice<br><br>Energy intake<br><br>Attitude to chosen food<br><br>Media use. | - Children consumed significantly more unhealthy food in unhealthy advergame condition.<br>- Children consumed significantly more healthy food in the healthy advergame condition | Fair |

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| | | | | | | to continue snacking for 20 minutes. After parents completed questionnaire about children's media use. | | | | |
| Mallinckrodt et al. (2013), United States | The effects of playing an advergame on young children's perceptions, preferences, and requests | To investigate the effects of playing an advergame on young children's food preferences and requests. | Experimental (between-subjects) | 295 | Mixed, 5-8 years | Participants offered to play Froot Loops Toss advergame (5 mins) on computers in a laboratory of their school (throwing Froot loops and fruit into a monster's mouth). Groups of 3-15 students participated.<br>Control group did not play the advergame.<br>Questionnaire distributed to participants in both groups after playing. Overall data collection took 20 minutes. | Advergame | Brand preference<br><br>Recognizing the commercial nature of an advergame<br><br>Understanding the intent of web promotion<br><br>Brand knowledge<br><br>Intention to request<br><br>Intention to pester<br><br>Liking of | - Compared with children in the control group, children who played a Froot Loops advergame that suggested the superiority of Froot Loops cereal over fresh fruit did not subsequently report more | Good |

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| | | | | | | | | advergame | often that they perceived Froot Loops as healthier.<br>- The preference for Froot Loops over the other cereals appeared to increase by age.<br>- Children's knowledge of the game's source was low.<br>- No differences by age or experimental group | |

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| | | | | | | | | | in their intention to request that someone in the family buy Froot Loops. | |
| Neyens et al. (2017), United Kingdom | Transferring game attitudes to the brand: persuasion from age 6 to 14 | To replicate previous findings regarding the differential impact of TV advertising and advergames on children's brand attitudes and pester intentions. | Experimental<br><br>Randomised between subject's design<br><br>One-off exposure | 940 | Mixed, 6-14 years | Participants were randomised to 3 conditions: view a TV ad, play an advergame, or no exposure to marketing. Advergame participants played Mission Jungle 2 on the Kellogg's Coco-Pops website (10 minutes). Participants had to collect as many Coco Pops as possible while avoiding obstacles. Afterwards, participants were given a standardized online questionnaire. | Advergame | Brand attitude<br><br>Intention to pester<br><br>Brand preferences<br><br>Brand recognition Persuasion knowledge<br><br>Source recognition<br><br>Source intent | - The findings further showed that children's attitudes towards the ad format mediate the impact of the advertising format on pester intent.<br>- The advergame was indirectly | Fair |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Attitudes towards the specific advertising format | more persuasive than the TV ad since children reported more positive attitudes towards the advergame compared to the TV advertisement | |
| Norman et al. (2018), Australia | Sustained impact of energy-dense TV and online food advertising on children's dietary intake: a within- | To see whether children would eat more at a snack after food advertising exposure compared with non-food | Experimental (within-subjects) | 160 | Mixed, 7-12 years | Study took place across four, six-day school holiday camps. Two media conditions (TV + advergame) or single media (TV only) which all advertised unfamiliar food brands. Participants in the multimedia condition played an advergame individually for 5 minutes. Half of these participants were exposed to | Advergame | Brand recognition<br><br>BMI<br><br>Energy intake | - Children within the TV plus advergame group ate significantly more snack foods after food advertisin | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | subject, randomised, crossover, counter-balanced trial | advertising. To see whether exposure to food advertising across multiple media would have an increased effect on children's immediate snack intake compared with those only exposed to food advertising from a single media source To see if any | | | | non-food brands, and the other half unhealthy food brands. Two groups of 20 children formed for each camp. Children were given breakfast, morning tea and lunch. Any difference in energy intake was measured to determine if energy intake was compensated for at lunchtime meal. Height and weight measured. | | | g (201 kJ) compared with non-food advertising, whilst children in the TV only group ate similar amounts at the snack after both the food and non-food advertisements | |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | | increased energy consumed as a result of exposure to food advertising was compensated for by children consuming less energy at the later lunchtime eating occasion. | | | | | | | | |
| Panic et al. (2013), Belgium | Comparing TV ads and advergames targeting children: the impact of persuasion knowledge on behavioral | To examine the impact of persuasion knowledge evoked by a commercial and a non-commercia | Experimental (between-subjects) | Study 1 = 254<br><br>Study 2 = 128 | Mixed, 7-10 years | Study 1: Participants played a Lay's advergame on the computer where players collect bags of chips to get to a Lay's party (2 minutes). One group played the game without the food cue, and the other played the game with the food cue. Participants were then filled in a questionnaire. | Advergame | Attitude toward the advergame<br><br>Intention to request<br><br>Source recognition<br><br>Source intent | · Study 1: Persuasion knowledge does not affect the persuasive outcomes for an advergame (with or without a | Fair |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | responses | l advergame on persuasive effects. | | | | Study 2: Participants individually played either the Lay's advergame or the healthy food game (2 minutes). Participants then filled in a questionnaire. | | Persuasion knowledge | cue) Children's intention to ask for Lay's chips drops significantly when a cue is added to the advergame. · Study 2: Results show no difference in the attitude between the Lay's game and the social game. The attitude toward the game appears to | |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | | | | | | | | | have a marginally positive effect on behavioural intention in the advergame condition. | |
| Putnam et al. (2018), United States | Character apps for children's snacks: effects of character awareness on snack selection and consumption patterns | To examine whether children's snack selections and consumption patterns are influenced by an app depicting a popular children's media character, as well as the role | Experimental (between-subjects) | 132 | Mixed, 4-5 years | Children played a bowling advergame (twice in succession making up 5 minutes) on an iPad with no character or with a character (Dora the Explorer) holding either healthier or unhealthy snacks. After app-play, children made a food (small banana or 1-ounce bag of Lay's potato chips) and drink choice (8-fluid-ounce carton of Tropicana 100% orange juice or 7.50-fluid-ounce can of Coca-Cola) and were allowed to consume these snacks. Children were asked why they selected the specific snacks to assess the | Media characters (in apps) | Food choice<br><br>Awareness of character | - An ordered logistic regression found no significant effect of treatment conditions compared with the control group.<br>- Within treatment conditions, awareness of the | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| | | that children's awareness of the character plays. | | | | explicit awareness of the link between Dora and the snacks. Children's awareness of the character was measured by children's verbalizations of the character's name during or after app-play. | | | character led to selection and consumption of more healthy snacks in the healthier condition (odds ratio β = 10.340, P = 0.008), and of unhealthy snacks in the unhealthy condition (odds ratio β = 0.228, P = 0.033), but children were unaware | |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | | | | | | | | | that the character influenced their decisions. | |
| Redondo et al. (2012), Spain | The effectiveness of casual advergames on adolescents' brand attitudes | To examine the influence of placement conspicuousness, exposure duration, and player gender in an experiment with Spanish-speaking adolescents under real-world conditions. | Experimental (between-subjects | 405 | Mixed, 11-17 years | An advergame with advertisements for M&M chocolate candy was advertised on a Spanish children's website. The game involved zapping multi-coloured counters. The first version had no brand placement. The other versions had two different degrees of conspicuousness (less vs more conspicuous). Two questionnaires given to participants when they first played the game. | Advergame | Brand attitude<br><br>Enjoyment of the game | · The whole casual advergames improve adolescents' brand attitudes.<br>· Brand attitude improvement occurred after both a brief exposure to the prominent placement and a long exposure to the subtle placement | Fair |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | | | | | | | | | .<br><br>· Female adolescents significantly improved their attitudes to M&M's, but no significant improvement was observed for male adolescents. | |
| Rifon et al. (2014), United States | Age-dependent effects of food advergame brand integration and interactivity | To examine the moderating effects of age on the relationships between the game tactic of | Experimental (between-subjects) | 276 | Mixed, 5-10 years | Participants invited to watch or play an advergame involving grabbing and collecting balloons or cereal boxes of an unfamiliar food brand. In the active exposure treatment condition, participants played the game, while in the passive exposure condition, participants saw a | Advergame | Attitude towards the game<br><br>Brand recognition<br><br>Persuasion knowledge | · Advergames affect children's brand recognition, attitude towards the brand, brand | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | | brand integration and the interactive nature of gaming on the brand-related outcomes for children, brand recognition, attitude, taste perceptions and requests. | | | | digital recording of the game being played. The control group's game contained no cereal brand information. After the game questionnaires were administered. | | Brand request<br><br>Brand attitude<br><br>Perceived healthiness of brand | taste expectations and brand requests<br><br>· Interactivity alone does not enhance a child's recall or positive attitude towards a brand placed in a game | |
| Vanwesenbeeck et al. (2014), Belgium | Children and advergames: the role of product involvement, prior brand attitude, persuasion knowledge | To investigate how the affective responses (i.e. brand attitude changes) of children aged 10-12 years differ | Experimental (between-subjects) | 279 | Mixed, 10-12 years | Phase 1: Administered 2 weeks prior to advergame playing – participants asked to rate their involvement and attitude towards four test brands using a scale. Phase 2: Participants were invited to individually play an advergame involving capturing blocks (5 minutes). Four separate conditions: | Advergame | Brand attitude<br><br>Purchase intention<br><br>Persuasion knowledge<br><br>Game attitude | · Playing an advergame does not necessarily lead to an improved attitude towards the | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | and game attitude in purchase intentions and changing attitudes | after playing an advergame depending on product involvement, brand attitude, persuasion knowledge and game attitude.<br><br>To examine how the behavioural intentions (i.e. purchase intention) of children aged 10-12 years differ after playing an advergame depending on product involveme | | | | The four conditions were: low product involvement and neutral prior brand attitude; low product involvement and positive prior brand attitude; high product involvement and neutral prior brand attitude; and high product involvement and positive prior brand attitude. After playing the game a questionnaire was administered. | | | advertised brands<br>· Persuasion knowledge had no significant effect on brand attitude change<br>· The level of brand attitude change in children who played an advergame featuring a brand previously evaluated as neutral differs from that of | |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| | | nt, brand attitude, persuasion knowledge and game attitude. | | | | | | | children who played an advergame featuring a brand previously evaluated as positive · Prior brand attitude is an important factor in the effectiveness of advergames aimed at children | |

Endorsers

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| Boyland et al. (2013), United Kingdom | Food choice and overconsumption: Effect of a premium sports celebrity endorser | To determine whether exposure to celebrity endorsement in television (TV) food advertising and a nonfood context would affect ad libitum intake of the endorsed product and a perceived alternative brand. | Experimental (between-subjects) | 181 | Mixed, 8-11 years | Children viewed 1 of the following embedded within a 20-min cartoon (The Simpsons): (1) a commercial for Walker's Crisps (potato chips), featuring a long-standing celebrity endorser; (2) a commercial for a savoury food; (3) TV footage of the same endorser in his well-known role as a TV presenter; or (4) a commercial for a non-food item. Children presented with 2 bowls of 100g potato chips (one labelled Walkers and one labelled supermarket brand). Children were told that they could eat as much/little as they liked. Height and weight measured. | Celebrity endorsement | Energy intake | - Children who viewed the endorsed commercial or the TV footage of the endorser outside of a food context consumed significantly more of the Walker's chips compared with children in other groups. These children did not reduce their | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | | | | | | | | | intake of the supermarket brand product to compensate; thus, the endorser effect contributed to overconsumption. | |
| Dixon et al. (2014), Australia | Effects of nutrient content claims, sports celebrity endorsements and premium offers on pre-adolescent children's food preferences: | To assess pre-adolescent children's responses to common child-oriented front- of-pack food promotions | Experimental (between-subjects) | 1302 | Mixed, grade 5-6 | Perceived weight status recorded. Participants randomly assigned to: nutrient content claims, sports celebrity endorsements, and premium offers. Online, participants chose their preferred product from a randomly assigned EDNP (energy dense, nutrient poor) food pack (sweetened breakfast cereal, cheese dip snacks, ice cream bars, frozen chicken nuggets and flavoured milk) and comparable healthier food | Celebrity endorsement | Food choice Perceptions on nutritional content Product ratings | - Compared to the control condition, children were more likely to choose EDNP products featuring nutrient content claims (both | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | experimental research | | | | | pack then completed detailed product ratings on 7-point Likert scales. Participants asked to indicate whether they thought the EDNP food product contained high or low levels of four nutrients. Participants rated the EDNP and healthier comparison products on how healthy they considered the product to be and whether they thought the product looked fun, tasty, as good as other brands, good value for money and popular with children. Participants also rated a typical child who would eat/drink the brand, how they thought the brand would make them feel, how likely they were to buy the product and their interest in tasting the product. | | | genders) and sports celebrity endorsements (boys only).<br>- Perceptions of nutritional content were enhanced by nutrient content claims.<br>- Effects of promotions on some product ratings (but not choice) were negated when children referred to | |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | the nutrition information panel.<br>- Premium offers did not enhance children's product ratings or choice. | |
| Putnam et al. (2018), United States | Character apps for children's snacks: effects of character awareness on snack selection and consumption patterns | To examine whether children's snack selections and consumption patterns are influenced by an app depicting a popular children's media character, | Experimental (between-subjects) | 132 | Mixed, 4-5 years | Children played a bowling advergame (twice in succession making up 5 minutes) on an iPad with no character or with a character (Dora the Explorer) holding either healthier or unhealthy snacks. After app-play, children made a food (small banana or 1-ounce bag of Lay's potato chips) and drink choice (8-fluid-ounce carton of Tropicana 100% orange juice or 7.50-fluid-ounce can of Coca-Cola) and were allowed to consume these snacks. Children were asked | Media characters (in apps) | Food choice<br><br>Awareness of character | - An ordered logistic regression found no significant effect of treatment conditions compared with the control group.<br>- Within treatment conditions, | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| | | as well as the role that children's awareness of the character plays. | | | | why they selected the specific snacks to assess the explicit awareness of the link between Dora and the snacks. Children's awareness of the character was measured by children's verbalizations of the character's name during or after app-play. | | | awareness of the character led to selection and consumption of more healthy snacks in the healthier condition (odds ratio β = 10.340, P = 0.008), and of unhealthy snacks in the unhealthy condition (odds ratio β = 0.228, P = 0.033), but children | |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | were unaware that the character influenced their decisions. | |
| Smits et al. (2012), Belgium | Endorsing children's appetite for healthy foods: Celebrity versus non-celebrity spokes-characters | To measure the effects of celebrity versus non-celebrity spokes-characters without interference of other potentially important factors (such as the congruency with the product) | Experimental (between-subjects and within-subjects) | 57 | Mixed, 6-7 years | The interviewer conducted a base line measurement and a follow up measurement with each participant (12-20 mins each). A set of questions were repeated for four types of foods (grapes, chocolate, apples and cookies). Participants were asked to indicate frequency of consumption, current appetite and the frequency they asked their parents to buy these foods. In the follow up measurement the same pictures of foods were used, but instead they were accompanied by a "Kabouter Karel" (gnome) a licenced character. One healthy item and one unhealthy item were accompanied by the gnome. The other unhealthy and | Celebrity endorsements and promotional characters | Frequency of consumption Frequency of purchase requests Hunger | - Adding a spokes-character (i.e., a gnome) to a food product increases the appetite, the (intended) frequency of consumption and the (intended) frequency of parent requests for that product among 6- | Fair |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | healthy item was accompanied by a non-celebrity gnome. Half the participants first rated the foods endorsed by the popular gnome while the other participants first rated the foods endorsed by the generic gnome. | | | to 7-year-old children, for both unhealthy and healthy foods.<br>- The effect of the celebrity spokes-character is in all cases greater than the effect of a similar (but unknown) gnome. | |

Print advertising

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| Jones et al. (2011), Australia | An experimental study on the effects of exposure to magazine advertising on children's food choices | To determine the feasibility of an experimental research design to investigate the effects of exposure to magazine advertising on children's food choices. | Experimental (between-subjects) | 47 | Mixed, 5-12 years | Children were asked to read either Krash magazine (with food advertisements) or D-Mag (no food advertisements) for 15 minutes. Children were then asked whether they like reading advertisements/believe the information in ads. Children were also given two vouchers for the in-class store which could be redeemed for their choice of snack foods (three items were advertised in the magazine, other similar items that were not advertised, and healthy foods). | Magazine | Food choice<br><br>Attitudes towards advertising format | · The participants showed generally positive attitudes towards magazine advertising<br>· Children in the experimental group chose more advertised food items and less of the non-advertised unhealthy food items<br>· Participants in both groups | Fair |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | | | | | | | | | were equally (un)likely to select a healthy food item. | |
| Jones et al. (2010), Australia | Like me, want me, buy me, eat me': relationship-building marketing communications in children's magazines | To examines children's responses to relationship-building marketing communications found in popular children's magazines. | Cross-sectional and Friendship-pair interviews | 10 | Mixed, 6-13 years | Activity 1: Participants shown a sample of popular children's magazines and asked whether they are familiar with the magazine<br>Activity 2: Each friendship pair was asked questions about four different styles of food advertisements (3 out of 4 styles were gender specific)<br>Activity 3: Participants were shown a series of 10 flash cards each with a different food product or brand logo, and then asked to discuss with each other and the interviewer any knowledge or thoughts about logo. | Magazine | Brand recognition<br><br>Attitude to advertising format<br><br>Brand attitude | · Children notice, like and are receptive to the marketing strategies used in these magazines<br>· While younger children have less of an understanding of the intent of most magazine advertisements, older | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | | | | | | | | | children appear to be susceptible to more sophisticated marketing strategies. | |
| King et al. (2008), United Kingdom | Magazine adverts for healthy and less healthy foods: Effects on recall but not hunger or food choice by pre-adolescent children | To investigate the effects of exposure to printed advertisements for healthy, less healthy and non-food products on children's mood, hunger, food choice and product | Experimental<br><br>Randomised between subject's design<br><br>One-off exposure | 309 | Mixed, 9-10 years | Participants received stimulus booklets (with either healthy food ads, less healthy food ads or non-food ads). After booklets were taken filled in, participants underwent a product recall assessment. Participants chose coupons for raisins or confectionary and collected their chosen snack. A week after, height and weight information was collected. | Magazine | Self-perception<br><br>Mood<br><br>Hunger<br><br>Body shape satisfaction<br><br>Food choice<br><br>BMI | · No group differences in self-perception, mood, hunger or food choice were found after viewing printed adverts for healthy or less healthy foods, or compared | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | | recall. | | | | | | | with non-food adverts<br>· Recall was significantly higher for less healthy foods, even when estimated prior exposure to advertisements was accounted for.<br>· There was no effect of advert group on food choice. | |

Internet

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| Pettigrew et al. (2013), Australia | The effects of television and Internet food advertising on parents and children | To examine the impact of television and Internet food advertising on Australian parents and children | Experimental (between-subjects) | 2604 | Mixed, 8-14 years and their parents | Participants were exposed to a Television advertisement, an Internet advertisement or control pictures for four commonly advertised energy-dense, nutrient-poor foods. All television advertisements were 30 seconds and promoted; Fried chicken (family eating chicken together at dinner) popcorn (mother making popcorn for her child playing outside on a trampoline), a snack bar (children eating the product at school), and confectionery (athlete eating the sweets after a training session). The control group saw static images of the food products. After exposure, participants were then asked a series of questions about the products. | Television commercial and social media | Brand preference<br><br>Brand attitude<br><br>Frequency of consumption<br><br>BMI | · Advertising can lead both parents and children to evaluate products more favourably and influence their perceptions of the desirability and acceptability of food products<br><br>· The evaluation | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | | | | | | | | | s were more favourable among the advertising exposure groups relative to the control group | |
| Tarabashkina et al. (2016), Australia | Food advertising, children's food choices and obesity: interplay of cognitive defences and product evaluation: an experimental study | To investigate the role of product evaluations, nutritional and persuasion knowledge on children's food choices | Experimental (between-subjects) | 354 | Mixed, 7-13 years | Questionnaires were administered to parents to collect children's biometric data. Children were randomly split into two groups (experimental and control) and spent 10 min surfing the Internet on websites of their liking. During the Internet surfing, children were either exposed (3 times) to a pop-up advertisement showing a snack (experimental group) or a toy (control group) to make the manipulation less obvious. The experimental advertisement featured a | Internet pop-up advertisement | BMI<br><br>Food choice<br><br>Product evaluations<br><br>Persuasion knowledge<br><br>Nutritional knowledge | - Children in the experimental group chose biscuit 1 more frequently compared with children in the control group (not significant).<br>- The factors | Good |

| Author (year), country | Title | Objectives | Study type | Sample size | Participant characteristics (sex, age) | Intervention components/exposure (description, duration) | Main marketing technique/ vehicle used | Outcome measures | Primary outcomes/ themes | Quality Assessment |
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| | | | | | | biscuit, which belonged to one of the 'Big Four' non-core food categories frequently advertised to children. Upon completion of the Internet surfing exercise, children were taken to a different part of the research stand where their food choices were noted down. Every child was shown a 32 × 42 cm box, which contained three snacks: (1) a snack shown in the advertisement (biscuit 1); (2) a healthy snack (an apple); and (3) a snack similar to the experimental stimulus (biscuit 2) and were asked to pick one for consumption. After food choices were noted down, children were asked to complete either a short online or paper questionnaire (product evaluations, nutritional knowledge, selling intent etc). | | | that undermine children's cognitive defences relate to taste, social appeal of foods and low nutritional and persuasion knowledge. | |

## Appendix W: Children's favourite brands

| Most favourite | Second favourite | Third favourite | Fourth favourite | Fifth favourite |
|---|---|---|---|---|
| Barilla | Nature Valley | Cadbury | Coles | Golden Circle |
| Zooper Doopers | Smooze | Woolworths | Aeroplane Jelly | Skittles |
| Dairy Farmers | Sushi Izu | Byron Bay Cookie Company | Sprite | McDonalds |
| Sushi Izu | Byron Bay Cookie Company | Coca Cola | McDonalds | Dairy Farmers |
| Ferrero Rocher | Poppin | Arnotts | Ritz | Sushi Izu |
| Malteaser | Woolworths | Hubba Bubba | Smiths | Mars |
| Poppin | Woolworths | Cadbury | Heinz | Nabisco |

| | | | | |
|---|---|---|---|---|
| Lindt | Minties | Eclipse | Up&Go | Oreo |
| Guylian | Connoisseur | Westacre | Sprite | Maggi |
| Woolworths | Woolworths | Blu | Mother Earth | Weet-bix |
| Westcliff | Arnotts | Vaalia | Forresters | Corale |
| M&Ms | Vege Chips | Arnotts | Pauls | Move |
| Zappo Chews | Berri | Coca Cola | Arnotts | Sakata |
| Zooper Dooper | San Remo | CC's | Arnots | Pascall |
| Smiths | Cadbury | Knopper | Cadbury | Arnotts |
| Nerds | Golden Circle | Cadbury | Joi Lite | Cadbury |

| | | | | |
|---|---|---|---|---|
| Monarc Crowns | Gourmet Blackstone Snack Co | Golden Circle | Kirks | Pascall |
| Sunkist | Solo | Hooplas | Twisties | Jumpy's |
| Lindt | Arnotts | Twinings | Sun Rice | Deli Fresh |
| McDonalds | Thins | Belmont | Up & Go | Powerade |
| Milo | The Natural Confectionary Company | Coca Cola | Cadbury | Twisties |
| Cadbury | Sakata | Maggi | Old El Paso | Coles |
| Remano | Hillcrest Mrs Millers | Uncle Tobys | GoldenVale | GoldenVale |
| Cadbury | Streets | Chupa Chups | Red Rock Deli | Kraft |

| | | | | |
|---|---|---|---|---|
| McDonalds | Sunkist | Cadbury | Allens | Smiths |
| Daily Juice Co. | Cadbury | Eclipse | Dominion Naturals | Pringles |
| Infuzions | Maggi | Norco Mighty Cool | McDonalds | Ajitas |
| Hershey's | Allens | Hubba Bubba | Cobs | KFC |
| Universal Candy | Hubba Bubba | Nutella | KFC | Cadbury |
| Kirks | Milo | Cheetos | Jumpy's | Kelloggs |
| Doritos | Black Swan | V | Bulla | Philadephia |
| Twisties | Fry’s | Obela | Uncle Toby’s | Dairy Farmers |

| | | | | |
|---|---|---|---|---|
| Arnotts | Streets | Aero | Uncle Ben’s | Sacla |
| Gippsland Dairy | Uncle Toby’s | Red Rock Deli | Golden Circle | John West |
| Arnotts | M&Ms | CC’s | Lilydale | Cheerios |
| LCMs | Doritos | Allens | Masterfoods | Weet-bix |
| Kettle Crisps | The Natural Confectionary Company | Peters | So Good | Milo |
| The Natural Confectionary Company | Old El Paso | Sun Rice | Fanta | Doritos |
| Fizzer | McVities | Wattle Valley | Weet-bix | Sprite |
| Lucozade | Changs | Golden Days | Arnotts | Berri |
| Australian Gold | Poppin | Coles | Nudie | CC's |

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|---|---|---|---|---|
| Mission | Heinz | Tamar Valley | Sprite | Peckish |
| Milo | Yumi’s | Uncle Toby’s | Grain Waves | Arnotts |
| Green & Blacks | Harvest Snaps | Streets | Maggi | Smiths |
| Coco Pops | Knopper | Tim Tam | Masterfoods | Up & Go |
| Arnotts | Oreo’s | Twisties | Sakarta | McCain |
| KitKat | Skadoos | Milo | Powerade | Pringles |
| Chobani | Smiths | McDonalds | Twisties | Connoisseur |
| Poppin | CC's | Healtheries | Woolworths | Bega |

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|---|---|---|---|---|
| Milo | Arnotts | Yoplait | Coca Cola | Nutella |
| Snickers | Cadbury | Greenseas | Twisties | Chris's |
| Cadbury | Trolli | Grain Waves | Milo | Arnotts |
| Connoisseur | Uncle Tobys | Powerade | Coco Pops | Nutino |